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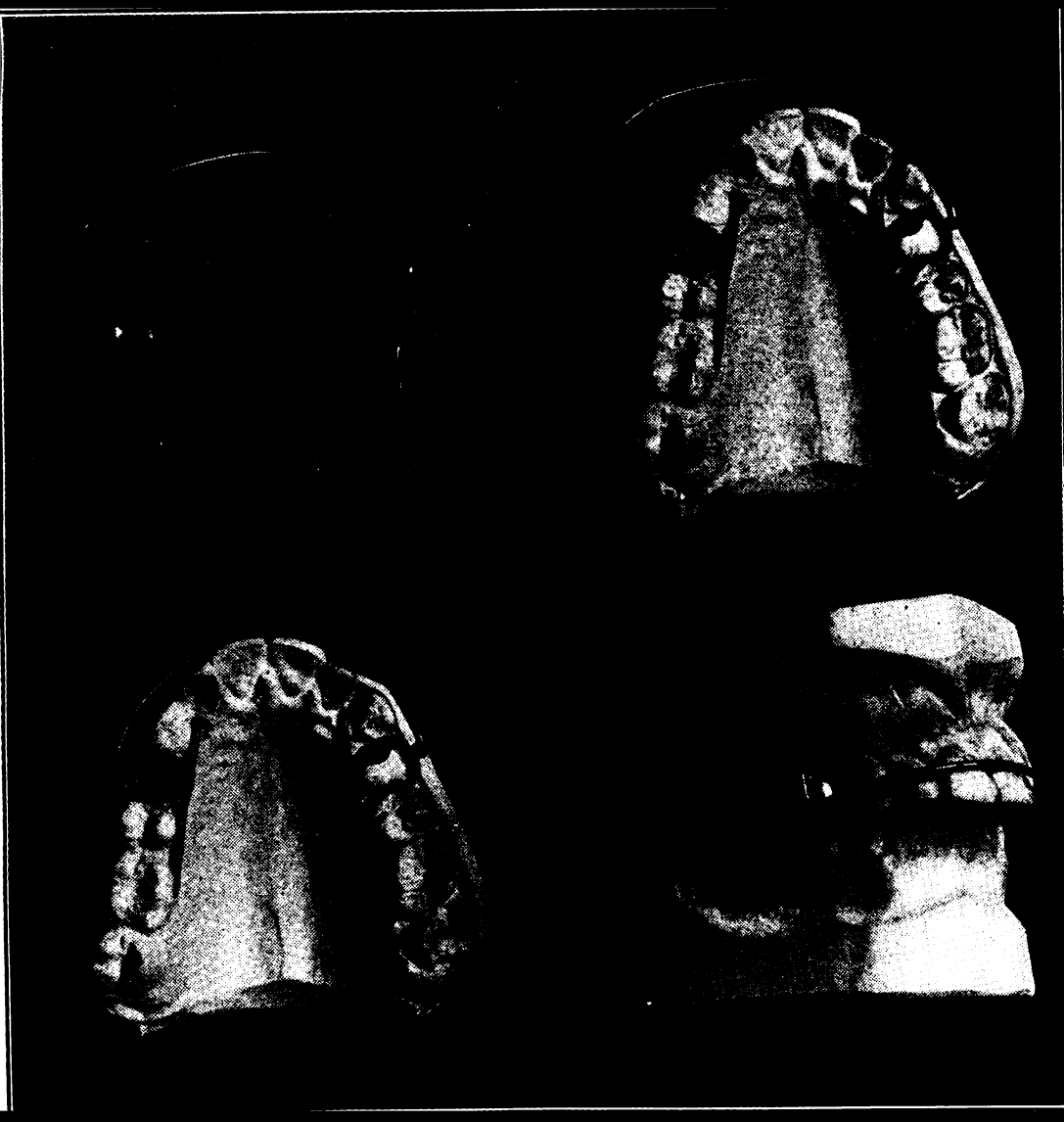

Transactions of the New York Institute of Stomatology

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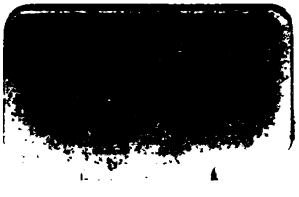

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TRANSACTIONS

OF

THE NEW YORK

INSTITUTE OF STOMATOLOGY

FOR 1904.

Reprinted from the International Dental Journal

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1905.

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THE

NEW YORK INSTITUTE OF STOMATOLOGY.

A REGULAR meeting of The New York Institute of Stomatology was held at the "Chelsea," No. 222 West Twenty-third Street, New York, on Tuesday evening, January 5, 1904, the President, Dr. Brockway, in the chair.

The minutes of the last regular meeting and of the annual meeting were read and approved.

Under the head of "Practical Talks on Interesting Subjects," Dr. S. F. Howland discussed the subject of sensitive necks of teeth.

Dr. Howland stated that we frequently found at the neck of a tooth extreme sensitiveness, which condition was very annoying to both patient and operator. Not very much had ever been said upon this subject except the advocation of nitrate of silver. This seemed to be objectionable, because it discolored the teeth. Dr. Howland stated that he had used with great success tannic acid, which was the active principle of all vegetable astringents. His method was to place a drop or two of glycerin on a slab and mix it with tannic acid. He then sharpened a stick to a flat, blunt point, and after drying the sensitive point to be treated he applied the mixture and with the stick rubbed very gently at first, gradually increasing the pressure until finally he was able to rub the tooth as hard as he wished without any pain whatever. One application was usually sufficient. Although a remedy was seldom found that would never fail, Dr. Howland could not remember an instancee where this method had failed to give relief. In reply to a question of Dr. F. Milton Smith, as to how long this relief was expected to last, Dr. Howland had never noted a recurrence of the sensitiveness. He not only used it to reduce this sensitiveness where there was no real decay of the tooth-structure, but he also used it as an obtundent in the same way.

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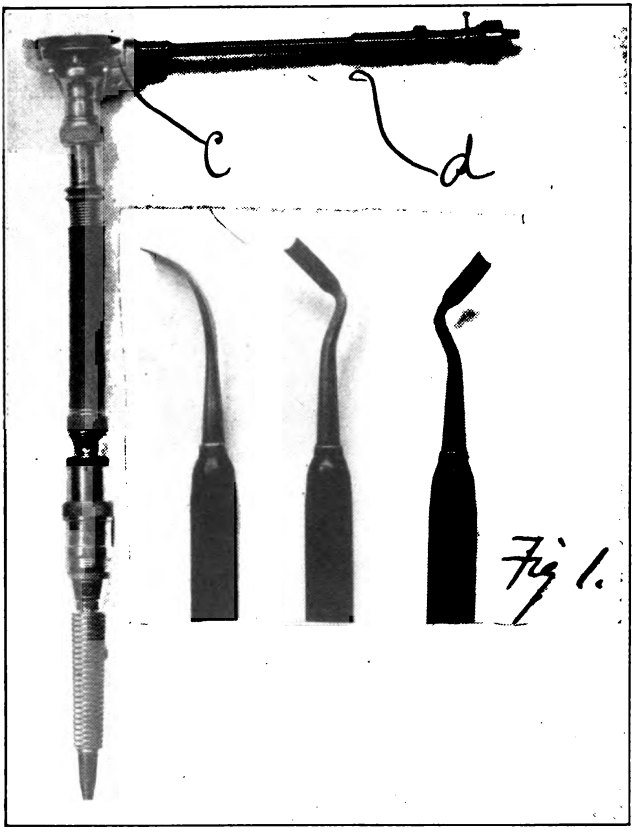
In reply to a question from Dr. S. E. Davenport as to whether this pressure with the stick was necessary, Dr. Howland had never tried it any other way, as it had seemed very effective when rubbed with the stick.

Under the same head, Dr. T. W. Onderdonk stated that he

FIG. 1.



had several things which he wished to present. First, a set of scalers (Fig. 1), which were no more nor less than heavy enamel chisels, one right, one left, and one direct, all curved, with concave cutting edges which act very much as half-round scrapers do in scraping the mast of a boat.

Second, a compromise dental engine arm, which consists of a

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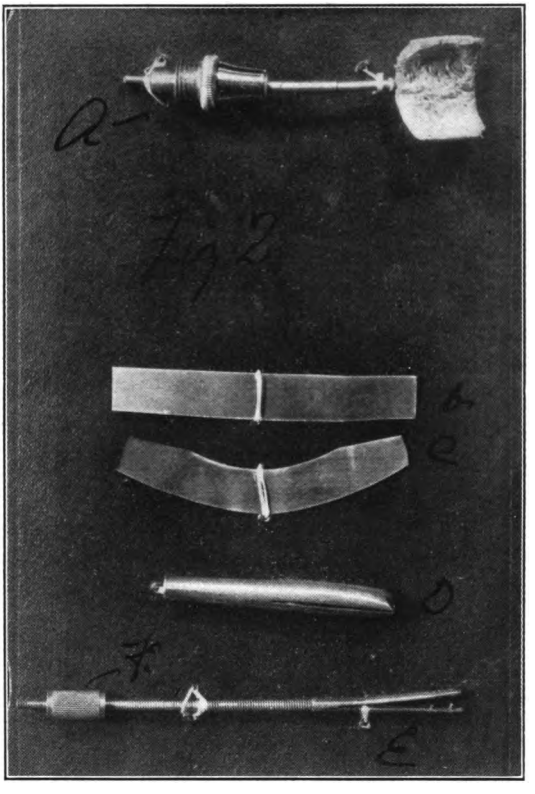
duplex spring (Fig. 1), with which most cable engines are equipped, a hand-piece attached to one end, and a small pulley wheel to the other (*c*). This is attached to the forearm of any all-cord engine at *cd,* giving all the freedom of the cable engine, together with the direct revolution of the all-cord engine, without the disagreeable features of either.

FIG. 2.



Third, an electric crown heater (Fig. 2, *a*), an instrument, as its name implies, for softening the gutta-percha cement of crowns and bridges so attached, when their removal is desired. It is a curved strip of metal with some high-heat gutta-percha on the inner surface, attached to one end of the electric tool holder. To use it, bend the metal so that it will pass over the crown to be removed, turn on the current, and in a few seconds the crown can be taken off.

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Fourth, Dr. Onderdonk stated that he considered the following general features essential for an ideal matrix. The matrix should grasp the tooth tightly at the cervical margin and at the same time restoring the natural contour. It should be easily adjusted and not interfere with the introduction of the filling, not easily displaced but removable at will, permitting the examination of the filling as it progresses, and be returned to its original position.

He then presented a band dentometer, contour matrix and holder. The apparatus consisted of two parts, band and holder. The bands (Fig. 2, *b, c*) are cut from strips of very thin metal, either brass or German silver, two inches long and the width the case requires. For a dentometer the bands are cut straight (Fig. 2, *b*). For a matrix the bands are cut curved, the greater the curve the larger the contour (Fig. 2, *c*). The holder consists of three parts. The movable jaw, or vice, the fixed jaw, or holder, and the rotary handle. The movable jaw (Fig. 2, *d*) is of brass about one and a half inches long and three-eighths of an inch in diameter, with a hole through the centre for the introduction of the fixed jaw and a slot for the bands to enter.

The fixed jaw, or holder (Fig. 2, *e*), is about three inches long and one-eighth of an inch in diameter, with a screw thread cut almost the entire length; on one end is the grip, which is very much like a small pair of tape pliers, containing two pins which grasp the metal bands. The rotary handle (Fig. 2, *f*) is about the same diameter as the movable holder, and is from one-half to three-quarters of an inch in length; this turns on the screw thread of the fixed jaw.

Dr. S. E. Davenport thought that Dr. Onderdonk was getting himself into trouble, as those who were not fortunate enough to sit near to him during these demonstrations would be besieging him at his office, where, as Dr. Davenport had found recently, Dr. Onderdonk was able to explain the many advantages of the appliances in even a better manner than he had done to-night.

Dr. Davenport would like to ask, in the case of a combination gold and amalgam stopping such as Dr. Onderdonk mentioned, where the gold was applied before the amalgam had crystallized, whether Dr. Onderdonk depended upon separate anchorage for the gold, or did he expect a union between the gold and amalgam sufficient to hold the gold? Dr. Davenport said he would also like to know what gold and what amalgam Dr. Onderdonk used.

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Dr. Onderdonk stated that it was not his intention to enter into the discussion of the technique of filling teeth, and he merely had mentioned this method to bring out the value of his appliance. His preference was to fill the amalgam portion at one sitting and the gold afterwards, when the amalgam was hard. But if for any reason it was impracticable, the gold could be introduced at once. In either case he treated the gold filling exactly as if it, the amalgam, were tooth-structure. He used Fellowship alloy and Moss fibre gold usually, annealing it in the electric furnace. If the amalgam had not set, he used the first pieces of gold small, forcing them into the amalgam. In certain cavities in bicuspids it was his custom always to use amalgam with the gold. In these cases he preferred the amalgam soft, forcing the gold into it.

Regarding the central that he mentioned, which he filled with amalgam posteriorly, Dr. Onderdonk stated that in giving the operation in detail of course he would use a lining of cement next the anterior enamel, to prevent discoloration. He considered this method good practice in certain cases, rather than to resort to a crown. He never crowned a central tooth if he could avoid it.

Dr. Chas. O. Kimball, regarding various devices, wished to speak first of Dr. Onderdonk's appliance. He had had a couple made some time ago in accordance with Dr. Onderdonk's plans, but he found upon examination that they were not like these. These were much better. He found them exceedingly useful instruments. They were of great value in inserting a composition filling where considerable pressure was desired. Such a matrix could be removed without placing any strain on the filling. He had used them frequently in the amalgam and cement stoppings.

Dr. Kimball also spoke of a trifling little device which he had found almost invaluable. Many of those present used for polishing teeth the little soft rubber cups. If their experience had been like his, they had been found very satisfactory for that purpose, as by this appliance it was possible to polish under the free margin of the gum. This was important in order to polish the teeth thoroughly. These little rubber disks will curve and work up under the margin of the gum on the rounded surfaces of the teeth that are accessible with this instrument. Dr. Kimball had found this difficulty: in a wet mouth the saliva would work back and get into the hand-piece, so that it required to be frequently taken apart and cleaned. It had occurred to him some time ago that

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this could be obviated by reversing one of the cup-shaped disks and placing it on the shank of the instrument. This worked very well, but with the curious result that when it was revolving the slightest touch would cause it to work right away from the hand-piece and up to the point of the instrument. At first he had cut a groove on the shank and slipped the disk into that, but that had not proved quite strong enough, although it was an improvement. Recently he had soldered, with soft solder, a ring of wire on the shank. This worked perfectly.

Dr. Kimball called attention to the hickory sticks for holding the gum back in cervical operations. He had mentioned this method two years previously. Since that time he had been using another device of the same nature. Instead of the hickory he used a piece of thin steel cut and shaped to fit the individual case and then soldered with soft solder to a broken instrument. This could be cut carefully to fit the curve of the tooth and the gum, holding back the gum with the least possible pain.

Dr. Kimball also presented a very useful instrument for polishing fillings, particularly in concave surfaces that could not be reached with the strips or disks. It consisted of a long instrument, thin and flat at each end, one end charged with corundum, held to the instrument with shellac, and the other end carrying a small piece of Lake Superior stone held in the same manner.

Dr. Gillett, referring to the instrument mentioned by Dr. Kimball for holding the gum back, thought that in many instances an instrument not so long, and that could be held by placing the finger on the end of it, was of great advantage. Also, instead of having the end broad and flat, it was sometimes desirable to have it terminate in points, even a single point being oftentimes desirable.

Dr. F. Milton Smith wished to disclaim originality regarding the gold inlays credited to him by Dr. Onderdonk. As he had previously stated, the method was brought to his attention first by Dr. Rheinhold, of this city. Dr. Dwight Smith, of this city, had also given him some valuable ideas. His own work in this direction was the result of the combined ideas of these two gentlemen and others, with perhaps a trifle of ingenuity on his own part. His friend Dr. Rheinhold stated to him that Dr. Andrews, of New York City, first called his attention to these tips. As Dr. Smith remembered it, the specimen in the cast passed around, *combining*

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the abraded surface repair and the two approximal surface restorations, was first suggested by Dr. Dwight Smith.

Dr. Kimball stated, relative to the union between gold and amalgam that he had occasion, many years ago, to repair an old amalgam filling with gold. He had done this with no thought of a union between the two, but had prepared a natural retention for the gold. Some time after, the tooth had broken and the whole filling came out. He was surprised to find that although the amalgam filling had been inserted many years before the gold, the two had become firmly united, so that they could be separated with great difficulty.

Dr. Gillett had great faith in these combinations, and used the gold and amalgam fillings to a large extent in favorable cavities. It was his practice always to pack the gold directly on the fresh amalgam, believing that he got a better filling thereby than by doing the operation in two sittings.

Dr. S. E. Davenport thought Dr. Gillett's remarks proved that Dr. Dwight Clapp's influence in New York City was very strong still, and he was very glad of it.

Dr. J. Morgan Howe called attention to a paper by Professor R. H. Thurston, of Cornell University, on "Scientific Research," published in *Science,* September 12, 1902, in which he stated that the late Roberto Austin, an English metallurgist, had placed lead and gold in contact, "and later found that the molecules of gold had started off on a journey independently, into the lead, some of them reaching a distance from their original positions of two inches in as many years." Dr. Howe thought this item worth recording in this connection as throwing some light on the peculiar results observed in combining gold with tin, and gold with amalgam, in fillings.

Dr. H. L. Wheeler read a short paper entitled "Home Manufacture of Formaldehyde for Sterilizing Purposes."

HOME MANUFACTURE OF FORMALDEHYDE FOR STERILIZING PURPOSES.

BY DR. H. L. WHEELER, NEW YORK.

THE particular use of formaldehyde that I shall mention in this paper is in connection with the sterilizing of instruments. Ever since I have boiled my instruments to make them aseptic I

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have been looking for a suitable means to produce the same result, and at the same time avoid some of the evil effects of boiling water upon steel and wood, ivory, celluloid, etc. The advent of formaldehyde, or, more accurately, formic aldehyde, as a powerful germ destroyer seemed to offer the needed substance; and my object in coming before you this evening is to suggest to you an easy way to manufacture this powerful germicidal gas. Formaldehyde (CH_2O) is produced by dry distillation of calcium formate or by the oxidation of methyl alcohol. It is a gas, and is readily absorbed by water, so that a forty per cent. solution is upon the market under the proprietary name of Formalin. For instrument and room disinfection it is prepared either by some dehydrating agent like calcium chloride, or by lamps for burning wood alcohol.

My experience with several of these specially constructed and patented lamps for this purpose having been decidedly unsatisfactory, and an attempt to get the patentee in one case to strive to remedy the difficulty having proved futile, I set about to find something that could be used steadily and regularly without failure in a short period of time. So far as I know, all the lamps sold for this purpose depend upon a platinized asbestos for the agent that will become incandescent and produce the oxidizing process which breaks up the wood alcohol into formic aldehyde ($CH_2O + H_2O$). This platinized asbestos is made by a secret process, and can be purchased by the ounce from any chemical supply house, but it has not proved lasting in the lamps I have used. To remedy its annoying tendency to fail when needed, I adopted the plan, after some experimenting, of taking a small piece of sponge platinum cut thin and holding it just above the wick of any ordinary alcohol lamp by any contrivance one may wish to construct. Light the wick and heat the platinum to incandescence; then extinguish the flame of the lamp and the metal will retain a dull glow and continue to produce formaldehyde as long as there is alcohol in the lamp. I simply bend a piece of German silver wire the desired shape for holding my sponge platinum in place, as is shown by the lamp I will pass around. I have also found that the ordinary lamp used under a chafing-dish, which is filled with asbestos covered with wire netting, works admirably for this purpose, only you must first, after lighting the lamp, hold the piece of metal up where it will become thoroughly heated, then

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extinguish the flame and drop the platinum upon the wire netting, and you will produce the gas. These lamps can be used in any suitable inclosure, as an oven of tin or copper, a tin box, or a chafing-dish, cutting a hole through the bottom large enough for the burner of the lamp to extend inside the receptacle; and the instruments can be placed in any way desired within the inclosure. The amount of formaldehyde manufactured in a given time depends upon the area of the piece of platinum and the size of the wick. I do not know if this suggestion has ever been published before; if so, I have not seen it, and I give it to you in detail that you may not be prohibited from using it by a patent; for patents seem to be becoming more and more an injury, and are threatening to entirely erase what ethics we possess. It is my desire to call attention to the advantages of publishing, as a matter of record, without securing a patent, those ideas, mechanical and otherwise, which we think may be of advantage to the profession and, through the profession, to humanity.

In order to do this I shall call attention to some examples which will necessitate showing conversely how we have suffered from patents, largely due to a lack of reasonable foresight and a proper regard for ethical standards upon our part. Almost with one accord we subscribe to the funds of the Dental Protective Association to prevent our being mulcted by the Tooth-Crown Company, and yet as an organized body of men we have taken not one step to prevent the same evil coming upon us in the future in the only way it could be prevented,—viz., to promptly deny standing in any of our societies to any member of our profession who becomes so forgetful of his duties as a professional man as to acquire a patent on any implement or material to be used by the profession. We have courted a recurrence of the difficulty by an apparent approval of those who obtain patents, as is evidenced by observing what a large proportion of men invited to appear before our societies are there for the precise purpose of calling attention to some device which they have patented. From a purely financial point of view this policy of encouraging patents and at the same time raising large sums to fight them is such a lack of intelligent self-interest that I cannot conceive of a body of men of less than ordinary ability who would do these things as a plain business proposition. Note how large sums of the Dental Protective Association were spent in fighting the patents on the Donaldson broach,

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—in the interest of a rival supply house, unless I am misinformed, —and, after proving invalid a patent that had nearly expired, we are still paying the original price of two dollars and fifty cents per dozen for the genuine Donaldson broaches because those made to imitate them are of such a quality that they in no way compete with the original. Place beside this the decrease in the price of dental burs. Dr. William Rollins, of Boston, published a cut of the so-called "revelation" bur, or a similar one, in the *Archives of Dentistry*, January, 1885. He had previous to this tried to persuade a well-known dental supply house to manufacture this bur, but without success; later they were patented by this supply house, and they began their manufacture. Subsequently a rival house began the making of the same bur, and in the attempt to get an injunction upon this latter house the patent was proved invalid, because Dr. Rollins had published a description of the bur prior to the granting of the patent. The ultimate result was we were able to obtain burs at one dollar per dozen which before had cost two dollars and twenty-five cents, all due to one man having the foresight to publish his device without covering it with letters patent; and it did not cost the profession thousands upon thousands of dollars to prove the patent invalid.

I notice, in a late appeal for more funds from the members of the Dental Protective Association, it is stated that we have been protected from paying royalty on inlays by this Association. The author of this statement must be misinformed, or he lacks information; and that it will probably pass as authoritative indicates what a lack of knowledge there appears to be among the members of our calling, due, no doubt, to our habit of being fed pap by the supply houses through their faithful organs the dental journals published by them. It is a matter of record that Dr. Rollins described various methods for making metal moulds for porcelain fillings in a paper read before the Boston Society for the Advancement of Oral Science in June, 1880, while porcelain inlays ground to fit the cavity were used by Dr. Volck and his method published in the *American Journal of Dental Science* for July, 1857. In view of these published records, is it not obvious that patents taken out by Dr. Land in 1887 upon certain methods could not have required any great amount of time or expense to have proved them invalid? I am minded also of the case of the cervical clamp devised by Dr. Woodward and suppressed because

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a supply house claimed it was an infringement on an instrument already manufactured by them; although this latter instrument is greatly inferior to Dr. Woodward's. Were members of our profession to refuse to take out patents, and to carefully publish for record their inventions, the supply houses could not use a patent on an inferior device as a club to suppress superior instruments in which, in many instances, there is a grave doubt if there be any infringement whatever. The organized corporation has the advantage, as they mostly retain an attorney by the year, part of whose duties is to protect the corporation by shutting off all implements possible that would compete with their own product; and every time a member of our profession takes out a patent and sells it to a manufacturer he is increasing the difficulty of every member of the profession to obtain instruments suited to his individual taste and necessities.

DISCUSSION.

Dr. Swift stated that he had been using this method of sterilization for some time in the form of the Low sterilizer. It had given great satisfaction. The apparatus was manufactured by the Buffalo Dental Manufacturing Company. The sterilizing agent was produced by a cone of sponge platinum fitted over the alcohol lamp. The shape of the instrument was very satisfactory.

Dr. Gillett agreed with Dr. Swift regarding the Low sterilizer. He thought it a very satisfactory apparatus, although he could see no reason why the one devised by Dr. Wheeler would not be of value. Regarding the other part of the paper, Dr. Wheeler argues that the dental profession has suffered greatly from dental patents; *ergo,* there should be no dental patents. Great injury had resulted from the misuse of drugs, but for that reason it would hardly be wise to give up drugs entirely. It would seem that Dr. Wheeler's statement, that the result of patent litigation was always in favor of the organized corporation, was one of the best possible arguments in favor of Dr. Crouse's organization, which Dr. Wheeler is refusing to support. By doing this he was refusing to take the one essential step to make effective the opposition to *unjust* dental patents. It was the unfair dental patents that were objectionable, and it was time now for the profession to rally and make effective the means of opposing these unjust patents. The opportunity should be taken advantage of promptly, lest it be lost.

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Dr. Wheeler stated that he was acquainted with the Low sterilizer, but that the cone, instead of being sponge platinum as stated, was really made of platinized asbestos, and required frequent renewal.

Dr. Henry W. Gillett read a short paper on "Perplexities in Connection with Extraction of Teeth."

PERPLEXITIES IN CONNECTION WITH EXTRACTION OF TEETH.

BY HENRY W. GILLETT, D.M.D.

THE matter of which I wish to speak first will perhaps seem to you a barren one to present before this society. Certain perplexities of my own in connection with the extraction of teeth have led me to speak of them, with the hope that I, at least, may get some benefit from your comments. I am not going to open the subject of when to extract, but will assume that most of us occasionally feel it necessary to advise the extraction of an impacted wisdom-tooth, or to insist upon the removal of useless foul and decaying roots. I also assume that most of us prefer that these operations should be performed by an "extracting specialist."

This is, at least, a fair statement of my own position, and I am confident that in the main it agrees with the practice of many of you.

My own experience in sending difficult cases of extraction to so-called extracting specialists has been unsatisfactory, in that they have always returned to me with what has seemed to me an unreasonable amount of inflammation and irritation of the parts adjacent to the operative field. Having spent much of my professional life in a small city where extracting specialists were not accessible, I have found it necessary to do some such operations myself. The very marked difference in the sequelæ of cases where the mouth has been thoroughly sprayed immediately before and after the operation with some sterilizing agent, preferably a peroxide of hydrogen solution, as compared with similar cases where this course has not been followed, has forced itself so strongly upon my attention that I now consider such spraying an essential preliminary to the extraction of teeth. Similar spraying after the operation seems to me desirable but possibly less necessary.

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The means for preventing the pain of the operation itself have been developed till it makes tooth extraction almost too attractive to the possessor of painful but still salvable teeth, but in many cases the frequently more serious suffering which follows operations in a septic field seems to be taken as a necessary evil, and no effort is made to prevent it.

It would seem as if, in many cases, the only precautions taken by the operator were to ascertain with certainty which tooth its possessor wishes to part with, and to give his anæsthetic so as to avoid pain while the operation is in actual progress.

Personally, I feel that this ruthless tearing away of an organ with little or no regard for the welfare of adjacent tissues is much too common to do us credit. What surgeon would endorse even the smallest cutting operation in any other portion of the human anatomy, when it was surrounded by removable calcular deposits, swarming with all kinds of bacteria, and bathed in fluid bearing pyogenic organisms from adjacent pus-pockets, without preliminary efforts at cleaning and sterilizing the operative field. Yet in this twentieth century this is what many self-styled "Oral Surgeons" are doing.

I realize that some of you will say it is practically impossible to sterilize the mouth. This is undoubtedly true. It is also undoubtedly true that the mouth bacteria may be so thoroughly subjugated in a few minutes as to result in great practical benefit to the patient undergoing operations at that point.

This statement has been preliminary to presenting for your consideration the question whether this society, in view of the importance to its members of knowing that their patients are to receive satisfactory attention with due regard to the progress of surgical knowledge, may assume the duty of appointing a committee to formulate the general rules which seem desirable to observe in such operations, and shall (either with or without preliminary report to the society, as may be deemed best) call to the attention of such local practitioners as advertise themselves as extracting specialists the formulated rules, and, upon invitation by such practitioners, inspect their operating-rooms with a view to reporting to the society the names of those who are found equipped for the carrying out of these rules. This at first thought may seem inquisitorial, but when it is remembered that these practitioners appeal to us for their patronage, and that there is

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often laxness in the essentials for common cleanliness, not to mention the requirements of asepticism in their establishments, it seems to me a warrantable inquiry, and one which those extracting specialists who realize its value to them will hasten to meet in such manner as to insure the approval of the committee.

Dr. H. W. Gillett read a paper entitled "Spalding's Porcelain Jacket Crown."

SPALDING'S PORCELAIN JACKET CROWN.

BY HENRY W. GILLETT, D.M.D., NEW YORK.

FOLLOWING the suggestion of Dr. C. H. Land for a porcelain jacket crown, Dr. Edward B. Spalding, of Detroit, has worked out a different technique for a crown, which is so artistic in final result, and so fascinating in the precision of the different steps of its development, that it arouses immediate interest wherever shown.

Most of you are probably familiar with the article by Dr. Land in the *Dental Cosmos* for August, 1903, on "Porcelain Dental Art," in which he figures a porcelain crown similar to the one I will show you to-night.

Dr. Spalding wishes to give credit to Dr. Land for the original suggestion of such a crown. The development of the technique of the crown I am to show you is entirely Dr. Spalding's work, and seems to me a distinct advance over Dr. Land's.

In order to describe intelligibly Dr. Spalding's procedure, we will assume that we are dealing with a deformed superior cuspid tooth, with either living or dead pulp, but with such defects of development as to call for treatment of some kind. The first step is to take a wire measurement of the circumference of the tooth at the gum margin. The second is to give the crown of the tooth a conical shape from the gum margin to the occlusal end, to give it a distinct shoulder at or just under the gum margin, and to shorten it. This Dr. Spalding accomplishes with rather thin three-quarter-inch disks of carborundum for the broad surfaces, and finishes with small inverted cone carborundum points, mounted for both hand-pieces, at the angles resulting from the use of the larger disk.

The third step is to cut a piece of matrix platinum in the shape of a trapezoid, with its base line the same length as the wire measurement in the first step.

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Fourth, unite the edges of this piece with a minimum quantity of pure gold, forming a truncated cone-shape. Slip this over the tooth, making sure that its edge goes above the shoulder left at the gum margin, and with the dentimeter twist a soft wire ligature around the matrix just below the shoulder, and with suitable pliers begin to draw the surplus platinum to the mesial and distal sides in two flattened wings, and also over the end of the tooth. Clip off most of the surplus at the end, leaving a little for a handle till the fitting is nearly done, and fold over the surplus at the sides, cutting off part of it first if there is much excess. Burnish the matrix accurately and smoothly to the tooth. Dr. Spalding uses for this work a bone instrument, of which I have made a rough imitation for your inspection. It is a valuable instrument, and my use of it convinces me that a bone or ivory burnisher will be very helpful in inlay matrix formation. The feel of the bone instrument as it passes over the platinum is a distinct relief as compared with the drag of a steel instrument.

Fifth, select a rubber tooth (Dr. Spalding uses at present Consolidated teeth) of suitable color and shape, and with carborundum stones cut it to the shape of the sample facing shown. Note that the tip is hollowed out and the shoulder and enamel surface of the palatal side of the tip is left intact. This is accomplished by using the same small carborundum stone used for finishing the shaping of the tooth. This shoulder is a very important aid in the further work.

Sixth, wax this to the matrix, with latter in correct position on the tooth, using gutta-percha and wax mixture; remove carefully; grip with suitable pliers, one jaw of which passes inside the matrix and the other engages a corresponding point on the labial surface of the facing. Remove the wax and place "block body" on one side near the tip and jar it carefully through till it appears on the other side, then build it round the top of the cone and, setting on end in the furnace, fuse the body. It is essential that the body for this first bake be kept away from the shoulder in the matrix. This block body Dr. Spalding makes by grinding up in the mortar pinless teeth of the same make as the facing he uses.

Seventh, place the piece in position on the tooth and carefully perfect the fit of the matrix at the shoulder.

Eighth, apply body, carve, and fuse to finish.

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Ninth, remove the matrix and set in suitable cement.

Dr. Spalding is able to report use of these crowns only since last April,—about nine months. This is, of course, too short a period to enable us to define their permanent place in our resources for such work, but his report for that time is favorable without exception. He has had no breakages yet. He has the matter so thoroughly worked out, and is so conservative in his own estimate of it, that the fact that he continues to think well of the method is sufficient evidence that it has value.

For molars, Dr. Spalding builds up the entire crown with block body.

A possible objection to these crowns over live pulps is the difficulty of getting access to the pulp in case pulpitis develops after the application of the crown.

Dr. McNaughton presented to the museum of the Institute some curios in the way of teeth carved from ivory, and the superior maxilla of a "sheep's-head" fish. These were donated by Dr. Nash.

A vote of thanks was extended to Dr. Nash for his kindness in presenting these interesting specimens to the Institute.

Dr. Fossume presented an engine attachment for carrying wooden points, used in cleansing and polishing teeth.

Adjourned.

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A MEETING of the Institute was held at the "Chelsea," No. 222 West Twenty-third Street, New York, on Tuesday evening, February 2, 1904, the President, Dr. Brockway, in the chair.

Owing to the amount of material in the regular transactions, the communications on theory and practice were omitted.

The regular subject of the evening, Oral Hygiene and Prophylaxis, was discussed.

Dr. Sinclair Tousey stated that Dr. Leo Green and he had been working for some time on a method for the treatment of pyorrhœa alveolaris by means of the X-ray apparatus. They had quite a number of successful results to report later, but as yet they were not quite ready. Any members of the society who were interested he would like to invite to a demonstration of the apparatus, either at the St. Bartholomew's clinic or at his office. He also had a specimen of radium. He would also demonstrate a method he had perfected of the immediate development of the picture taken by means of the X-ray machine and without any dark room, only a comparatively dark space being necessary. The print could be ready for exhibition in five minutes after the exposure.

Upon motion, the thanks of the Institute were extended to Dr. Tousey for his kind offer.

Dr. E. S. Gaylord, of New Haven, stated that the subject for this evening, oral prophylaxis, was a most important and interesting one, yet he had not prepared a paper, and the little he had to say would be more in description of the work of another than anything he had been able to accomplish himself. In July last it was his good fortune to receive an invitation from Dr. D. D. Smith, of Philadelphia, to attend a clinical examination of a number of his patients' mouths who had been under his care for several years. There were eleven other dentists from different parts of the country in attendance. Dr. Smith had made appointments with his patients, to avoid confusion, and upon arrival, they were introduced, and a brief description given of the prior condition of the mouth by Dr. Smith, supplemented by the patient. Each gentleman was given the opportunity to thoroughly examine the mouth, Dr. Smith requesting not only a thorough examination, but to criticise whatever they might find. The first patient arrived soon

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after nine in the morning, the list of patients was completed a little after four, and they had examined twenty-nine mouths. Until about a dozen patients had been examined, it was his impression (and, he afterwards learned, that of others) that they were examining selected cases, and certainly those that required no dental operations, being in condition of perfect health. Their verdict was unanimous: positively there was no room for criticism, either of the fillings, crowns, or bridges, or general condition of the mouths; they seemed as nearly perfect as possible. In November last he again received an invitation from Dr. Smith, and with seventeen other dentists, representing nearly as many States, they spent nearly the entire day in examination of the mouths of thirty patients. Thus he has seen over fifty of Dr. Smith's patients, ranging from the ages of six to sixty-five. In many there were evidences that they had not been in a normal condition, and by the testimony of the patient, they learned there had been much suffering, both physical and mental, prior to Dr. Smith taking them in charge. Pyorrhœa in its worst form had been perfectly eliminated, and around the teeth was to be seen the beautiful restorations of the gingivæ, teeth firm in their sockets, entire surfaces beautifully polished, striations of the gums, giving evidence of a condition with which, in their own practice, they thought themselves unfamiliar; indeed, there was such sameness and perfect condition, that, as some one remarked, it seemed monotonous. In children's mouths they saw no evidence of caries having occurred, and he believes he is safe in affirmation that no caries occur in any of these mouths when well under treatment, and here it seems to him is where Dr. Smith is deserving of so much praise, in conceiving and executing the necessity of frequent treatments, which consist in systematically polishing the entire surfaces of the teeth every month with pumice and orange-wood stick, at the same time massaging the gum margins, thus not only preserving a condition of health, but seemingly a restoration or preservation of their natural colors; certain it is there was little variation in the shade of the teeth, even in different mouths. Dr. Smith asserts, and it seems reasonable, this rubbing with stick and pumice stimulates circulation within the tooth, thereby preserving natural hues and normal conditions. Dr. Smith has designed a set of scalers, both unique and unusual in form (made by J. W. Ivory), in that they are to be used in the manner of a file, with draw cut, which after removal of the calculus,

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leaves the surface of the teeth smoother than the ordinary scaler, and able to follow into pockets farther with greater ease and less pain than with any other form with which he was familiar. After thorough scaling, the teeth are thoroughly polished with the orange-wood and pumice, held in a very neat form of porte-polisher of his own device, and each tooth is polished, not only on its crown, but, where pyorrhœa exists, to the bottom of each pocket; the pockets are then washed with a strong solution of phenol sodique, after which, in severe cases, a deliquesced solution of zinc chloride is carried in with the point of a small stick, the ordinary wood tooth-pick shaved thin serving a good purpose. Dr. Gaylord regards the opportunity of seeing this method of treatment of more value than he can well express, and he has carried it into his own practice with results that are so pleasing to his patients and himself that he will never abandon it. He would urge all to investigate, particularly the young men, as he believes it possible to conduct a practice, beginning with children, carrying them along through life with no fillings (except in imperfections in fissures), without the loss of a single tooth, and pyorrhœa absolutely unknown to them.

Dr. C. W. Strang was reminded of what Dr. Dio Lewis had said many years ago, that a clean tooth never would decay. If Dr. Lewis had stated that a perfectly formed tooth, properly kept clean, would never decay, Dr. Strang would feel more like agreeing with him. For that thing to be accomplished, the patient must polish his teeth almost every minute of the day. Dr. Strang mentioned the case of an old patient of thirty years' standing in his practice who from year to year had had very little to be done with the exception of the removal of a little soft tartar and the polishing of the teeth. Occasionally there had been a little filling to be inserted. About two years ago that gentleman's health had failed, and six months ago Dr. Strang had seen the patient and noted evidences of a change in the condition of his mouth. At that time he had been entered upon his books to be seen again in six months. At the end of this six months he was surprised to see the ravages of disease in that mouth. Dr. Strang believed that such progress of dental caries as this was due principally to the vitiated condition of the secretions of the mouth, more than to deleteriorations of tooth-structure. Dr. Black has told us that there is very little difference in the various specimens of dentine that he had examined. In the enamel there is a great difference. About

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five years ago Dr. Strang had made the statement before a local society in Providence that if we took patients in early life and were systematic and careful in cleansing and polishing their teeth we would have very little trouble from the development of pyorrhœa alveolaris in these cases. Dr. Strang had been fortunate enough when in college to be under the tuition of Dr. James Truman. Dr. Truman had always tried to impress upon the minds of the students the importance of keeping the teeth of every patient clean; that the younger men could not hope to compete with the older practitioners in many things, but they could compete in cleanliness. Dr. Strang had always endeavored to follow this teaching to his very best ability. At first the instruments obtainable for this purpose were very crude, but with time these had improved. He had been conscientiously trying for the past thirty-five years as far as possible to remove the deposits of tartar from his patients' teeth, but he did not believe he was any better able to do it to-day than he was five years ago, except that now he was equipped with a little better instruments. If anybody had told him two years ago that he was not doing as well by his patients as he ought, he would not have believed them; indeed, he would have been willing to compare any twenty-five or thirty of his patients with those of any other practitioner. He was glad that Dr. D. D. Smith had not had an opportunity to accept such a challenge. If any one had told him two years ago that teeth could not be properly cleansed with the dental engine, Dr. Strang would have said that he knew better. When he had seen the results of the work in Dr. D. D. Smith's office, it did not take him long to be convinced that he had been doing the work improperly. He had been so thoroughly convinced that since last July he had used the dental engine but three times in cleansing teeth, and then only to remove some stains.

Dr. Alfred C. Fones stated that he claimed little or no originality regarding the thoughts he wished to express on this subject. Our chief object should be the prevention of dental diseases, rather than being content with the repairing of the damages wrought. He said that micro-organisms, with their action upon food débris, were the cause of most of the pathological conditions found in the mouth. As it was seemingly impossible to entirely rid the mouth of these organisms, we should adopt some plan or system whereby our patients could keep their mouths clean and free from the accumulations of food products. The teeth presented about twenty-

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five square inches of surface. Now, if we compared the relative difficulties of cleansing a piece of smooth and then of ground glass of about this surface, the importance of keeping the teeth smooth and polished could readily be seen. The method used to produce this mirror surface was that advocated by Dr. D. D. Smith, using pumice and orange-wood sticks carried in holders, such as furnished by J. W. Ivory of Philadelphia. All surfaces of the teeth are thoroughly rubbed, considerable pressure being used, the edge of the stick kept sharp, in order to reach under the margin of the gums. Particular attention is paid to the necks of the teeth. Polishing strips are used on the proximal surfaces. It takes, generally, a number of thorough treatments to produce this high polish, but when once secured it may easily be maintained by monthly treatments of about a half-hour.

He said it was absolutely impossible to get the desired results unless we had the thorough co-operation of our patients and were arbitrary with them in insisting upon their systematically cleansing their teeth with tooth-brush and dentifrice. We should also prescribe the kind of brush and kind of dentifrice, and when and for how long they should cleanse their teeth. If we would be arbitrary in these matters it would be done as we directed and we would soon begin to get results. The average person spends, perhaps, twenty to thirty seconds brushing the teeth, in spite of what we all have heard them affirm,—that they spent fully five minutes at it,—evidently never having timed themselves. It was impossible to get proper results in less than ninety seconds for thoroughly cleansing the teeth and imparting a vascular stimulus to the gums.

Dr. Fones stated that he had some forty patients under practical treatment in this manner, and was much pleased with the results obtained. Through Dr. Smith he had become somewhat interested in the system some five years ago, but had not then realized its full value. He believed it was along the line of prophylaxis that future progress in the profession of dentistry would be made. He believed that the art of restoring lost tooth-structure had about reached its zenith, unless perhaps the ideal filling, a porcelain cement, might be discovered. The work of the future in preventing dental caries and the development of pyorrhœa would be found in extreme cleanliness. He said it was an ideal treatment for children's teeth and for adults who were susceptible to dental decay. After a thorough instrumentation in cases of pyorrhœa, he believed it to be the most effective treatment known.

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Regarding the theoretical side of pyorrhœa alveolaris, Dr. Fones considered the disease divided into (1) interstitial, (2) phagadenic pericementitis, and (3) gouty pericementitis, the third being rare, the first and second being conditions we were constantly meeting. It had been estimated that sixty-five per cent. of the teeth lost were lost from results of this disease. Although caries was more prevalent, it was not so fatal. He thought that the development of the disease might be placed under two general heads, one due to susceptibility and the other to a local exciting cause.

Every person, after passing the age of thirty-five, was susceptible to this disease; it was simply a question of degree. After this age the peridental membrane gradually became thinner, the alveolar process more dense, and there was a lessened vascularity and resistant power. Susceptibility of the patient was increased by nervous disorders, lowering the vitality, faulty metabolism, etc. The exciting cause was almost entirely produced by the irritation of the toxins and ptomaines generated by the action of micro-organisms on food débris around the necks of the teeth. Its quick response to extreme cleanliness and antiseptic treatment seemed to prove it. The stimulus imparted to the gums by the thorough and systematic brushing was imparted in turn to the underlying tissues, which lessened their susceptibility by increasing their vascularity.

To what degree these nervous disorders and faulty metabolic conditions were caused by systematic infection due to unsanitary mouths, it was difficult, at present, to predict. Chronic indigestion, neurasthenia, malarial symptoms, periodic headaches, throat troubles, and bad breath were cured or showed marked improvement in a comparatively short time. He believed there was a condition here producing systemic disturbances that the great majority of the medical profession had not dreamed of. The time was coming when the first law of hygiene would be recognized as a clean and sanitary mouth, and the assistance of the dental practitioner would prove indispensable to his medical brother in restoring many of his patients to health without the use of drugs.

Dr. Fones believed that the dental profession will owe Dr. D. D. Smith a debt of gratitude for demonstrating and calling our attention to this field of prophylaxis which is now opening up before us.

Dr. L. C. Taylor merely wished to reinforce the statements

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made. He thought the subject of Oral Hygiene and Prophylaxis a very important one. A vast number of people are to-day suffering directly or indirectly from mouth infection, and many cases of so-called stomach trouble can be cured by proper attention to oral cleanliness. It requires great skill to treat a set of teeth properly where pyorrhœa alveolaris is present. He mentioned a friend who thought a higher grade of skill is necessary than in an operation for appendicitis.

Several cases were mentioned of invalids being entirely cured by a careful attention to the septic condition of the mouth and polishing off the bacterial plague on the teeth. They had been suffering from mouth infection and nothing more. We have had ample description and abundance of literature upon the different kinds of bacteria found in the oral cavity. Dr. Andrews, Dr. Williams, Dr. Black, and may others have given us the result of their researches, but none have told us how to get rid of this infection. It is time that we get to the business side of it. We know these bacteria existed, we have seen them repeatedly, but have we seen the beautiful healthy mouth and the resulting tone of the whole system? This is what we want. It is a high ideal, but it is one worth attaining.

Regarding the much talked of connection between uræmia and pyorrhœa, and the consequent desirability of a systemic treatment for pyorrhœa, Dr. Taylor did not know of a single instance where a systemic treatment had cured a case of pyorrhœa, but he could mention numbers of cases where, the pyorrhœa alveolaris being cured, the uræmia had disappeared. It was another case of intestinal derangement due to mouth infection.

Dr. Taylor does not believe any living man can properly treat pyorrhœa of the mouth with the dental engine. He mentioned in this connection that the first practical teaching of oral hygiene and prophylaxis in any dental college was established in a dental school in New York City. He said he thought New York would see the time when she would be proud of this pre-eminence.

Dr. Taylor spoke with praise of the work done by Dr. D. D. Smith, of Philadelphia. He thoroughly approves his methods. He does not believe that in many cases it is possible at one sitting to get perfect health of the mouth. It will require from twelve to twenty consecutive months before that mouth will be satisfactory to the practitioner. The first two or three sittings will be sufficient

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to render the teeth mechanically clean, and thereafter each month the teeth may be gone over in thirty or forty minutes, but it will take months for the mouth to reach what might be called a perfect state of health.

Dr. Tousey stated that in the work at the St. Bartholomew's Parish, it was noticed that an unhygienic condition of the patient's mouths existed almost without exception, and in order to stimulate the children to be more cleanly they were taught to play what was known as the "tooth-brush game." The game had become very popular, and it was seen that some of the elders and parents were playing the game also.

Dr. Green stated that Dr. Fones's remarks about the care of children's mouths had led him to call attention to other features in this connection. He believed that prophylaxis should be extended to include proper nourishment even before the eruption of the teeth. He had noticed, especially among the children of wealth, that the modified forms of milk so commonly given to children had a very deleterious effect upon their teeth. These foods seemed to lack the essential properties required in tooth building. Furthermore, Dr. Green thought, where children are given over to a wet-nurse, too much attention could not be given to the condition of the mouth of the nurse. Dr. Green had been preparing statistics upon this subject, but as yet was not prepared to place them in the hands of the society.

Dr. Locherty stated that he would like to hear more concerning the medicines used in connection with this mechanical cleansing. He had himself, in the case of very persistent green stain, applied the rubber dam and first used iodine, following this with hydrogen peroxide in connection with a heated instrument, thus bleaching the surface and afterwards polishing. The results in these instances had been very satisfactory.

Dr. F. Milton Smith stated that in regard to this subject and the claim of Dr. D. D. Smith, of Philadelphia, it seemed to him that this perfect cleanliness of the teeth and mouth was the goal after which every man here was striving. That Dr. Smith succeeded better than any other man he knew he was willing to admit. He had seen a dozen or fifteen of these cases, and he hoped the time would come when he would be able to do as well by his own patients. However, he did not believe Dr. Smith was the first man to preach that cleanliness was the best thing we could accom-

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plish for our patients. If he had understood Dr. Gaylord, Dr. D. D. Smith claimed nothing new except persistence. He was very glad to hear this. He had made a statement himself to the effect that he believed the chief point in Dr. Smith's method was thoroughness, which is another word for persistence. However, according to his own understanding of the case, this was not all that Dr. D. D. Smith had claimed for his method. He had claimed something entirely new and something that he alone had advanced. There seemed to be some mystery about this point. He himself believed and it was generally conceded that a thorough polishing of the teeth, even as often as once in two weeks or once a month was a very beneficial thing, and he had several cases where he had proved the efficacy of this. Dr. Gaylord had stated that he formerly believed the teeth could be thoroughly cleansed with the engine. Dr. Smith had never believed that. However, he believed that with the dental engine, with scalers, files, and scrapers, with the polishing sticks and pumice, with the floss-silk, and with every other means available, it would be possible to pretty nearly remove all the foreign substances from the teeth, and when this was done as thoroughly and as frequently as it was done by Dr. D. D. Smith the results would be marvellous.

The President stated that he was most favorably impressed with the prophylactic method under consideration, and had read all the papers describing it, published by Dr. D. D. Smith, with great interest and profit. As he had remarked on a former occasion, he was an easy convert to the idea, for the first operation at which he was set by his preceptor at the beginning of his study of dentistry was the cleansing and polishing of teeth in the mouths of his patients. His preceptor had been a strong believer in the value of such service, and Dr. Brockway had always retained and practised what he was then taught.

He thought, however, that few if any of us had carried the cleansing process to the extent and thoroughness of Dr. Smith, which is its most important and distinguishing feature, and for this Dr. Smith has rendered our profession and the public which we serve what Dr. Brockway considers the greatest service of our time.

At first he was inclined, as were others, to take issue with Dr. Smith on his emphatic declaration that this work could not be accomplished by the engine, and while Dr. Brockway still holds

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that much of it can more easily be done thereby, it is perhaps necessary to supplement its use by hand-work with the porte-polisher and similar adjuncts for the purpose of obtaining the stimulating effect aimed at.

In this connection he wished to call attention to the value of tecum fibre as a most efficient article for the purpose of polishing the approximal surfaces of the teeth where the floss-silk and tape are generally used, this being fine, strong, and charged with native grit, silex, like the cortex of a reed, making it most admirable for the purpose required. It can be drawn between the most closely set teeth with the aid of a little vaseline, in extreme cases, which does not seem to impair its efficiency. Dr. Brockway thought that probably this article was not new to most of the men present, but, never having seen any mention of it in the discussions of this subject, he could not refrain from calling attention to its merits.

A vote of thanks was extended to the gentlemen who had so kindly presented this subject to the Institute.

Adjourned.

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A MEETING of the Institute was held on Tuesday evening, March 1, 1904, at the "Chelsea," No. 222 West Twenty-third Street, New York, Dr. Brockway, the President, in the chair.

The minutes of the last meeting were read and approved.

Dr. G. C. Ainsworth, of Boston, read a paper entitled "Some Thoughts regarding Methods and a New Appliance for moving Dislocated Teeth into Position."

SOME THOUGHTS REGARDING METHODS, AND A NEW APPLIANCE FOR MOVING DISLOCATED TEETH INTO POSITION.

BY GEORGE C. AINSWORTH, D.D.S., BOSTON, MASS.

IT has been suggested to assume that my audience is totally unfamiliar with everything connected with this subject except that they are dentists.

I wish to say that the time at my command since accepting the invitation to appear before you this evening has not been sufficient to accomplish all that I desired, more especially since some of the pictures which will be shown have necessarily been made from old models that were made with no thought of the importance of perfection, and simply for study models. Some of the appliances, too, in their application to the models are not perfect in their adaptation, but simply gotten up to demonstrate the theory of their application.

It is my purpose, this evening, to place before you *three* appliances, all of which I have been using for some time with much satisfaction, and while the principles involved are not new, the manner of applying them *is,* so far as I have been able to learn. The first is a self-acting spreading appliance, the second is an inclined plane for jumping the bite and adjusting the occlusion, while the third is a simple retaining appliance.

To appreciate the increasing need of orthodontic services, one has but to observe the faces of the rising generation we meet every day. The causes are many and the conditions alarming. Indeed, the patient whose teeth cannot be improved by the orthodontist seems the exception rather than the rule.

It also seems to be the opinion of those best able to judge, that

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this work should be largely done by the specialist. Certain it is that the successful orthodontist must be a man of large resource, —in art, in mechanics, and in patience,—for there is no hard and fast rule for the solution of all cases, and while we may classify them in general terms, there still remains an individuality which necessitates an independent solution of the case in hand according to its merits.

Nevertheless, while conditions remain as they are the average dental practitioner, especially in the smaller districts, will be called upon to do more or less of this work. It then becomes a duty for us to be keenly alive to any methods which may promise the greatest good with the least amount of suffering to the patient, as well as the least draft upon the time of the operator.

We should study to simplify methods and appliances, to minimize pain, and to economize time. Along these lines I have expended much time and thought to produce something that should be self-acting, requiring little attention, and which should interfere as little as possible with the ordinary functions of the teeth and mouth, not forgetting cleanliness, which presupposes simplicity and a due regard for one's appearance.

Teeth are made irregular by pressure, of one sort or another, and without pain. Why, then, should we not expect to make them regular by pressure without pain? In the first instance, the pressure is against nature, while in the second it is in accordance with her design. It seems, then, to be a question of applying the necessary force to move them in a proper way.

We have two kinds of force at our command,—the intermittent, as applied by the screw, and the constant, as applied by the spring, the lever, the ligature, and the elastic.

The claim has been made in favor of the screw pressure, that force thus applied was attended with less soreness and consequent discomfort; that there should be periods of rest between the periods of movement such as might be obtained by turning the screw each day; that the force having spent itself, the tooth rested until the next turn of the screw. That claim, it seems to me, is not borne out by facts; and while it undoubtedly is true that force applied by an elastic band or rubber wedge is attended with more soreness and consequent pain, it seems to be owing to that peculiar quality of elastic force as applied by rubber, and which differs from force as applied by a spring. What seems to be tolerated most kindly

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is a firm, gentle pressure, be it intermittent or otherwise. When a tooth first starts it is usually attended with slight tenderness, which, as a rule, quickly subsides without a letting up of that force; then, if the force is continued in a reasonable way, all goes well.

It is idle, perhaps, to talk about pleasure to the patient in having teeth regulated. Nevertheless, there are different degrees of comfort, and it is to obtain the maximum that we are striving. To do this the work had best go on slowly. The effort to accomplish an extensive piece of work in orthodontia in a remarkably short time seems to me to be ill advised, and not likely to be attended with as satisfactory results as it would have been had the change been conducted more gradually. All these changes are accomplished by force, which, if applied too suddenly, or too severely, renders nature antagonistic and rebellious, as evidenced by pain, heat, redness, and swelling,—she recognizes an enemy; whereas, if the force is applied gradually and gently, she looks upon you as a friend trying to help her, and takes kindly to your efforts, falling into line with all the assistance of which she is capable.

Again, where teeth are moved slowly they are less liable to be drawn out of, or away from, their tissue environment,—a matter of much importance, particularly when elongating teeth.

We come now to a consideration of the self-acting spreading appliance, which may have a double action,—*i.e.*, it can be so adjusted as to spread the arch and, when desirable, retract the incisors at the same time, or, by the addition of ligatures, the front teeth may be moved forward or elongated. In accomplishing the first two, it is entirely self-acting and requires very little attention, allowing the absence of the patient two, four, or even eight weeks at a time, yet its action is under the control of the patient at all times.

In the second instance, where ligatures are employed it requires closer attention, but where wire ligatures are used, even those allow the absence of the patient for some days. Yet I find many occasions to use silk ligatures, even though they require more constant attention, for the sake of cleanliness.

This appliance, in its simplest form, is composed of three members (Fig. 1, A),—two anchors and a wire spring, while the compound form has two springs. Each anchor is made up of three pieces,—a piece of seamless tubing, with 30-gauge walls, of suitable size and length to be fitted to the tooth chosen for anchorage,

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after the manner of forming a band for a gold crown. To this is soldered, on the palatal side and at right angles with the band, a piece of 16-gauge wire running along the border of the arch, with a bearing on and of sufficient length to engage all of the teeth to be moved on that side; while on the buccal side of the anchor band is soldered a short piece of 16-gauge seamless tubing running parallel with the band, to receive the end of the spring-wire,—the active principle of the appliance. These anchors, when completed, are adjusted to the teeth selected, and cemented firmly into place (Fig. 1, B)—one on either side of the arch, after which the two ends of the spring wire, bent at right angles to itself, are sprung into the tubes provided for them (Fig. 1, C). The inside bar is designed to move the bicuspids and molars as a unit without the aid of ligatures.

This case seems to be an unusually favorable one for this appliance, which in its operation has a double action. The sides of the arch are to be equally expanded and the incisors moved in (Fig. 1, D). The teeth to be moved out include the cuspids, the bicuspids, and the first molars. The spring, being adjusted to bear firmly on the labial surface of the incisors, presses those teeth in as the side teeth move out. The teeth chosen for attaching the anchor bands should be midway between the two points of resistance, and this perhaps more often fails on the first bicuspid than otherwise, though sometimes it may be the second bicuspid, or even the first molar.

My estimate of the central point of resistance in this case is the first bicuspid, the cuspid and first molar being the extreme points. You will readily see that if the pressure be applied in the molar region it would not expand the arch at the cuspid, which tooth offers marked resistance. If, however, during the operation you find your judgment has been in error for any reason, it is not a difficult matter to change the attachment to a more favorable location.

The time required to accomplish the desired change depends upon the age of the patient and the adjustment of the spring. I should not hesitate to dismiss this patient for two months after adjusting the appliance, but where convenient I would look at it about once in two weeks, always directing that if anything seems wrong, or soreness develops, to report at once. The spring, as you see, can be readily removed and readjusted by the patient.

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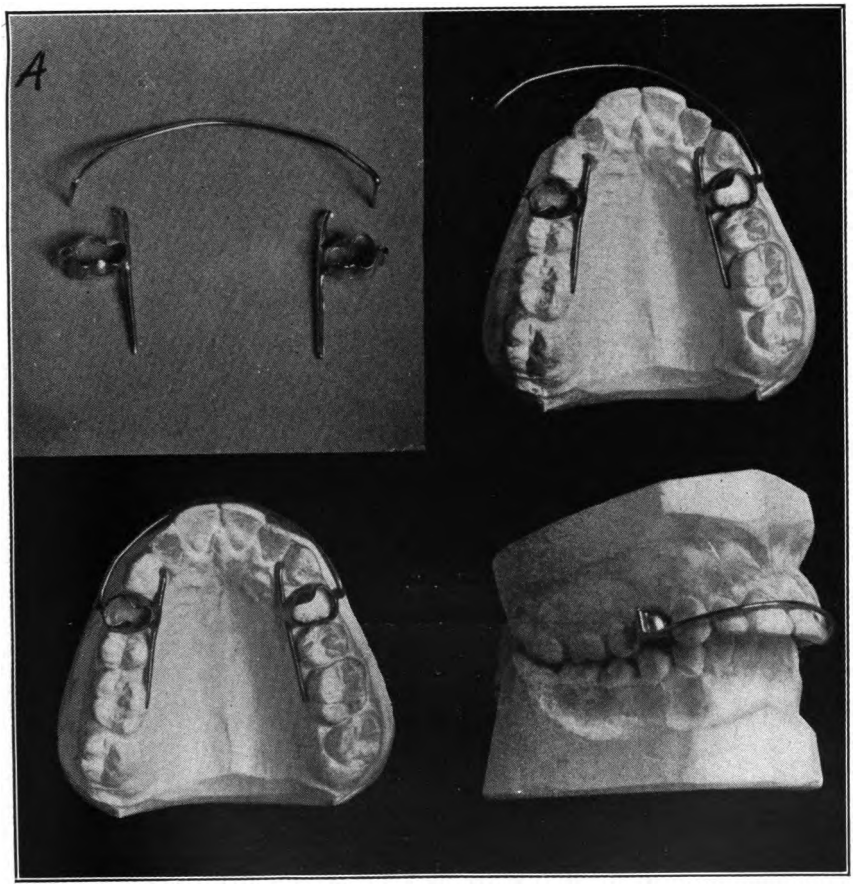
FIG. 1.

A B



C D

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FIG. 2.

FIG. 3.

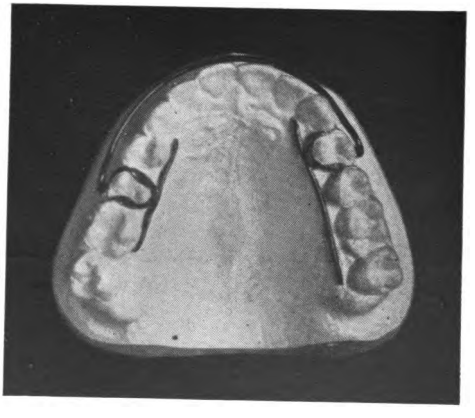

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FIG. 4.

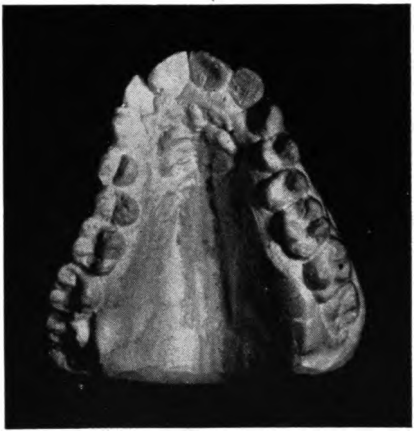

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FIG. 6.

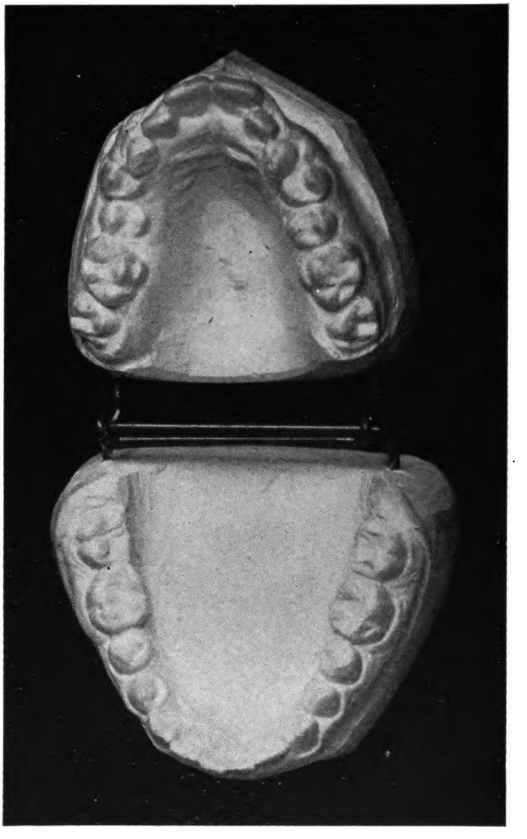

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Fig. 2 shows another case for the simple appliance. All the teeth seem in satisfactory relation excepting the second upper bicuspid on the right side, which occludes inside the arch.

The appliance was adjusted here to pit the resistance of the five teeth on the left—all the teeth from the cuspid to the second molar—against the resistance of the one displaced tooth on the right.

In eight weeks the tooth had moved to the position as you now see it (Fig. 3), with practically no attention or change, and, if I may believe the patient, without any pain or inconvenience whatever. Undoubtedly, had the tooth not been locked in by the approximating teeth, it would have moved to position in half the time. The small wire on the inside was put on as a precaution, lest the tooth should start suddenly, when it had progressed far enough to throw off the lateral resistance, and come out too far. On its completion the appliance was removed and a retainer, consisting of a simple band, cemented to the tooth, to the buccal side of which was soldered a piece of gold wire, similar to the one shown on the palatal side, the ends of which rested against the buccal surfaces of the approximating teeth.

Fig. 4 shows a case where the simple appliance would be appropriate, but where I should choose the second bicuspid for anchorage of the bands and place the spring-wire tubes at the antero-buccal surface.

Fig. 5 shows a case now under treatment where the slight contraction of the arch has forced the centrals and cuspids to assume a position outside of the arch, or perhaps, more correctly speaking, the bicuspids are inside of the arch. The simple appliance has been adjusted, anchored to the first bicuspids, and the arch is gradually spreading. I see the patient once a week, just to keep an eye on it, but as yet have made no change. In eight weeks, I should judge, the expansion will be sufficient to allow the turning of the cuspid teeth into position.

I have been asked to explain why I commenced work on the upper teeth instead of the lower. It is not always easy to give a lucid explanation of the reason for doing a certain thing, although one follows the dictates of his judgment—*instinct,* perhaps. It is true, nature begins her work in the adjustment of her masticatory apparatus by the development of the lower teeth first, but the conditions under which she does it are different from those presented

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to us for correction. She moves the teeth upward and downward on a line with the axes of the tooth, while we are called upon to move them sidewise. Again, the lower teeth are inferior in size and stability to the upper, which, when fully developed, have a larger controlling influence, and it seems to me as a rule easier to expand the larger arch first after which the smaller is more easily adjusted to it, especially as the upper jaw is stationary, while the lower is not. In other words, there are limitations to the possibilities of movement or adjustment in the upper jaw that do not obtain in the lower.

It is, however, perfectly practicable with this appliance to carry both upper and lower along simultaneously, sometimes a matter of much importance, since it lessens the number of visits and expedites the work. Indeed, there are many cases where inconvenience and discomfort are lessened by having the upper and lower carried on together.

Fig. 6 shows another case,—that of a nervous, excitable, young lady thirteen years of age. The parents dreaded the commencement of the operation, lest it upset her entirely. The simple appliance has been on now four weeks, with perfect comfort and happiness; in fact, I think she rather enjoys it. Her visits are made once a week in company with a young lady friend undergoing the same sort of an operation, and there is invariably a controversy between them as to which shall occupy the chair first. My attendant usually settles it by having them draw lots. I speak of this merely to show that the work is not always dreaded.

You will notice (Fig. 7) that the molars on one side occlude inside the arch, while the bicuspids are not yet far enough advanced to determine exactly where they would come. The appliance is anchored to the first molars, while the inside bar is so arranged as to guide the bicuspids out into a proper position. During the four weeks the arch has expanded three-sixteenths of an inch.

Of course, there is nothing remarkable in what is being accomplished in most of these cases, excepting the satisfaction of seeing them progress so favorably without laborious and painful attention. The gums are clean, healthy, and comparatively free from irritation.

Fig. 8 represents the teeth of a lady from forty-five to fifty years of age, and introduces the addition of another spring-wire and its attachment to the simple appliance, making a compound, self-

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FIG. 7.

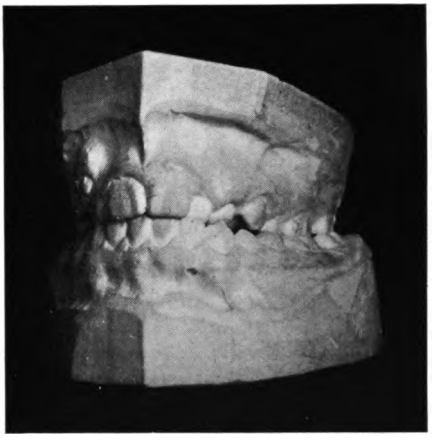

FIG. 8.

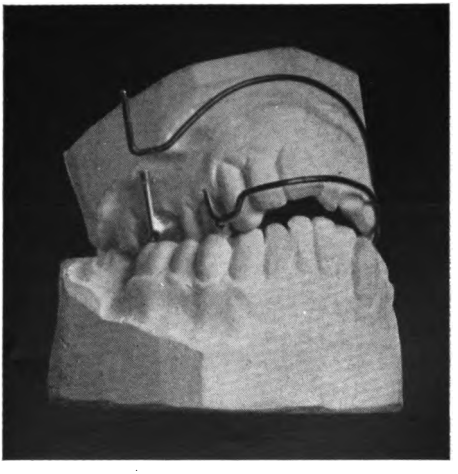

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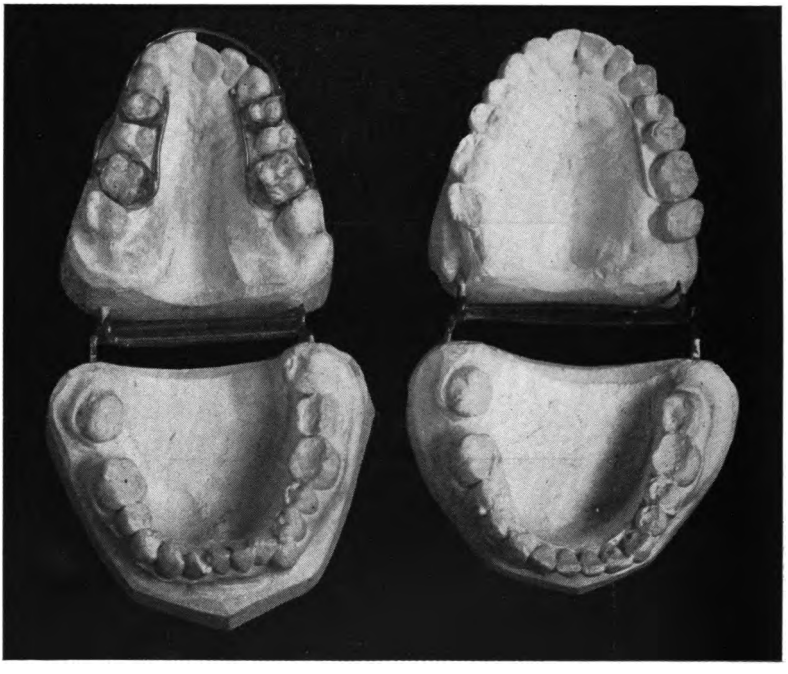
FIG. 9.

A B



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acting appliance which is applicable to those cases where *much* pressure is required at both the cuspid and molar region. The longer spring, acting on the molars, may be adjusted high up under the lip entirely out of sight, while the shorter one, acting on the cuspids, may be adjusted lower down at the pleasure of the operator.

All the teeth are present excepting the lower second molar on the right and the four wisdom-teeth (Fig. 9, A). The upper bicuspids and molars occlude inside the arch on both sides, the front teeth badly bunched, giving to the mouth a decidedly unpleasant expression, the lips closing over them with difficulty. The lower arch is of normal width, but the teeth are somewhat out of position in the left cuspid region, that tooth being, perhaps, one-sixteenth of an inch short.

The simple, one-spring appliance was put on this case in June, with the longer wire, as here shown, adjusted to the molar bands, while the appliance here shown represents what I would use were I to conduct the case again. If I remember correctly, I saw the patient three times before I went on my usual August vacation, but made no change in the appliance. On my return, early in September, I found the arch widened at the molar region fully one-half inch (Fig. 9, B), with the assurance from the patient that she had suffered no inconvenience whatever; in fact, she said she could not believe for a long time that it was accomplishing anything, it was so comfortable. The arch was spread at the cuspid region by a jack-screw running from cuspid to cuspid on the palatal side, after which the alignment was accomplished by the well-known arch band anchored to the molars. Fig. 10 shows the case completed.

You will observe that the tubes on the molars (Fig. 8) run high up opposite the ends of the roots. This was for the purpose of applying the expanding pressure in such a way as to move the roots and process at that point, the long ends of the spring-wire being bent out at such an angle as to apply force *there* when inserted in the tubes. It is also perfectly practicable to insert the wire the other way,—*i.e.*, at the top of the tubes,—and thus apply the force high up, overcoming the tipping tendency sometimes met with in other appliances.

Thus you will see that this appliance offers the possibility of many variations through additions and modifications, which unfold

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every day in our experience, to solve the problems as they are presented.

Figs. 11 and 12 show a case where the inside bar is used in connection with the ordinary arch band. The cuspids and bicuspids are to be moved out a little, while the front teeth are to be elongated and brought in.

The objection to the self-acting appliance here is the limited downward pressure obtainable with the spring-wire attached to the first bicuspids, besides the possibility of moving those teeth forward while in the act of pressing the front teeth in. If we anchor to the molars we shall not spread the arch at the cuspids and bicuspids without the addition of several ligatures, around those teeth. The same objection applies to the ordinary arch band, anchored to the molars with nuts at the distal ends of the tubes, but by combining the inside bar with this appliance we do away with all such ligatures, substituting one between the cuspid and first bicuspid on either side connecting the inside bar with the spring of the outside band. This will move those teeth out and not materially interfere with the downward spring of the arch band.

The inside bar soldered to the anchor band around the molar counteracts the tendency to the tipping of that tooth, which might be experienced by raising the arch band up and ligating to the front teeth.

The following case is shown, not because of its connection with any appliance presented, but for the reason that it is in some respects quite remarkable.

The gentleman presented at the age of forty-nine. The only contact between the upper and lower teeth was on the right side, between the second molars, which, instead of meeting each other squarely, passed by each other, wearing an inclined plane on either tooth (Fig. 13). The jaws closed much beyond the normal point, giving a most unpleasant expression to the face.

One molar and lateral are missing on the upper left side, and on the right side two molars, one bicuspid, the cuspid, and the lateral, seven teeth in all (Fig. 14, A). In consequence, the contraction of the jaw has been such that all the upper teeth strike well inside the lower arch, the incisors fully one-half inch.

On the lower jaw every tooth back of the first bicuspid on the left side had been extracted, and the right first and second molars were also missing. The question asked by the patient was, " Can

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FIG. 10.

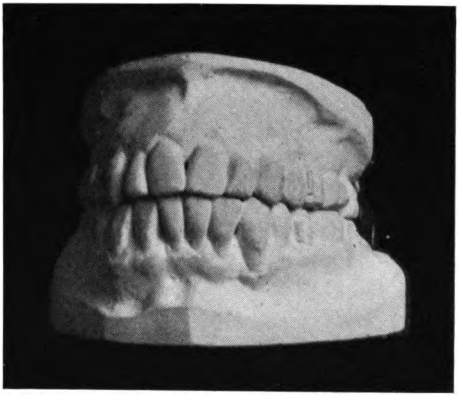

FIG. 11.

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FIG. 12.

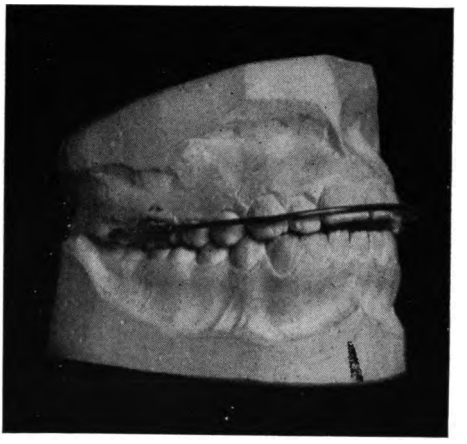

FIG. 13.

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FIG. 14.

A B

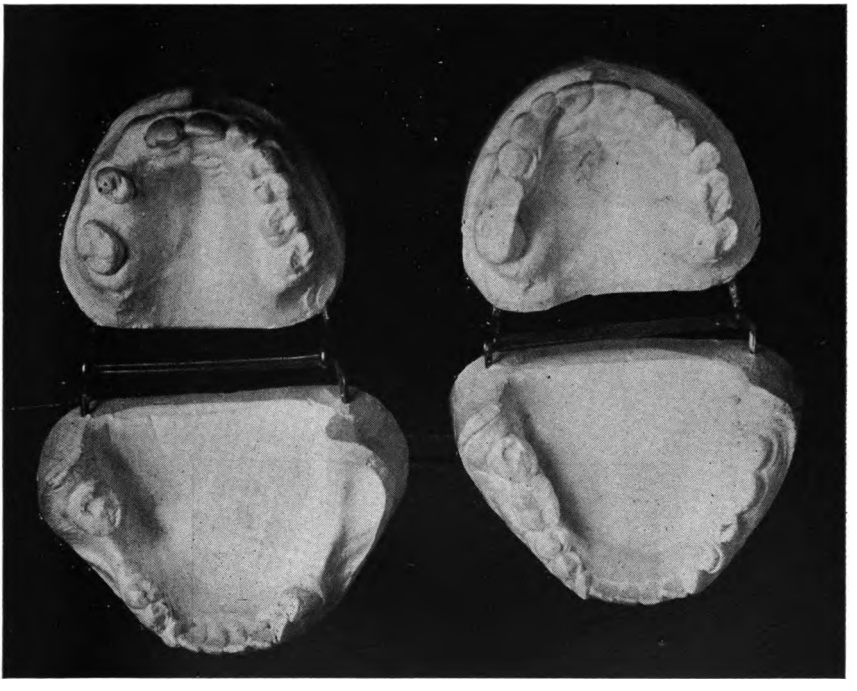

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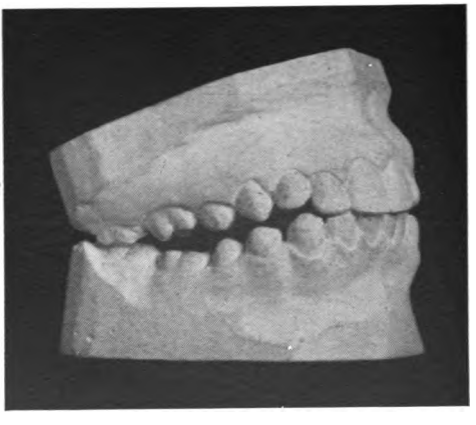
FIG. 15.

FIG. 16.



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you do anything for me, or must I be turned out to pasture to die like an old horse? I cannot chew as I am."

Three months' study of the case and models was necessary before a possible solution of an apparently hopeless case was determined upon. Artificial plates alone were out of the question, because of the great discrepancy in size of the two arches.

It was decided to attempt to widen the upper arch in order to bring the molars and bicuspids as nearly as possible over the lower, since every particle of movement in that direction would be a distinct gain; and to move the incisors as far forward as might be to improve the appearance, though it seemed absolutely out of the question to obtain an occlusion of the incisors.

In four months the result was beyond the most sanguine expectations entertained at the start, and a temporary retainer was inserted for the summer (Fig. 14, B).

In the fall a combined bridge and retainer in one continuous piece was made for the upper, using as abutments the molar and first bicuspid on the left side and the molar and second bicuspid on the right, swinging the missing intervening teeth on as dummies. The missing teeth on the lower jaw were supplied on a partial gold clasp-plate.

The result is a good masticating contact on either side back of the cuspid teeth and a reduction of the antero-posterior distance between the incisors to one-eighth of an inch (Fig. 15).

MAKING THESE APPLIANCES.

In making these appliances ordinary German silver is used for all except the spring-wire, which is eighteen per cent. nickel especially drawn for the purpose, with the maximum amount of spring obtainable consistent with toughness. If too hard, it is apt to break and cause annoyance. This I have obtained of the Holmes, Booth & Haydens Company, of Waterbury, Conn. The tubing, of various sizes, is seamless drawn, and especially made for me by J. Briggs & Sons' Company, 65 Clifford Street, Providence, R. I.

Ordinary plate, of German silver or gold, may be used, with platinized gold wire for the spring, if one prefers, but I have found the German silver to answer every purpose, and in some respects it is superior. Seamless drawn tubing possesses a marked advantage, particularly when soldering the small tubes to the anchor bands. The appliance when completed is gold-plated.

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In making the appliance the method of procedure is as follows: After cutting off a piece of seamless tubing of the proper size, anneal it, and with a pair of contouring pliers form it into a sort of barrel-shaped cylinder; next, with a small pair of scissors cut away a part of one end to approximately correspond to the gum line around the tooth; then gradually work it up into position, perhaps a little under the gum, take an instrument and mark around at the gum line; also at the top, so that there shall be a small projection left after trimming to turn over the edge of the tooth into the sulci, giving the band a firm seat when finally cemented to place. After trimming, the two bands are placed in position and a *plaster* impression taken; *this,* in my judgment, is important, as accuracy counts for much when one comes to set the appliance.

As a rule, it is reasonably possible to force a band of 30-gauge walls between the teeth, but sometimes, as an aid, I draw in some sort of a wedge for fifteen minutes or an hour, as the case may be. A rubber wedge works well for that length of time. Then, again, the edges of the band may be thinned a little and smeared with vaseline; one band may be crowded in a trifle and left while proceeding with the other. In short, a variety of expedients may be resorted to, that will be suggested to the mind of the resourceful man.

After the impression has been removed from the mouth the bands are carefully taken off and replaced in the impression, and the usual detail of making the model gone through with, the bands appearing on it exactly as they will stand in the mouth. Proceed then to adjust the palatal wires to fit the model as desired, being *particularly* careful, if intending to move the cuspids out, to turn that end of the wire well up under the gum in such a way as to engage that tooth above the bulge of enamel; otherwise, when the spring pressure is applied that end of the wire will slide down the incline plane surface of the cuspid instead of moving the tooth, resulting in a troublesome elongation of the tooth banded.

When these wires have been properly fitted, hold them in position by pieces of binding wire passed around them and through the model, twisting the ends till taut.

Next, to adjust the small tubes for receiving the ends of the spring-wire, pass an ordinary pin through them into the model in such a way as to hold them in position while being soldered.

Next, bur out a little of the plaster from within the anchor band

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opposite the points where the solder is to flow, and proceed to the soldering, which is done on the model.

The next step is to remove, finish, polish, and gold plate.

The labial spring-wire is usually fitted into position after the anchors are placed in the mouth, sometimes before cementing, sometimes after. If the front teeth are to be moved in and spaces closed up, the wire is adjusted to bear as firmly as possible on those teeth; if the front teeth are to be moved out, the wire is adjusted to stand out a bit to admit of the ligatures doing their work. Under favorable conditions, the fitting of the anchor bands and taking the impression can be accomplished in an hour.

PLATING PLANT.

Some sort of a gold-plating plant seems an important auxiliary to the dental equipment of to-day. A simple one is made up of a glass jar of convenient size with a cover to prevent evaporation and exclude dust, containing a fluid composed of thirty grains of chloride of gold, sixty grains of cyanide of potassium, and one-half pint of distilled water, operated by a single-cell Sampson battery. A piece of pure gold is attached to the carbon wire and suspended in the fluid, while the article to be plated is attached to the zinc wire and likewise suspended, care being taken that the gold and the article to be plated do not come in contact while in the solution.

In place of the Sampson cell, the wires may be connected with the ordinary electric lighting supply, in which case the current is run through a series of lamps to reduce it.

In the latter case the piece to be plated is left in the solution perhaps three minutes, when it is taken out and polished; this process is repeated several times according to the amount of plate desired.

ADVANTAGES.

In summing up the advantages of this appliance, its *simplicity* seems to stand out as a key-note far and above everything heretofore in use. Being simple, it is *cleanly,* doing away largely with ligatures, *always painful to apply and uncomfortable to wear.*

It is *effective,* because it is worn twenty-four hours every day, and the power is applied directly to the teeth to be moved. It interferes as little as possible with the ordinary functions of the teeth and mouth, besides minimizing the deleterious effect sometimes noticed from wearing a more complicated appliance.

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It is automatic in its work, and may be adjusted so as to have a double or, by the addition of ligatures, a triple action,—*i.e.*, it will spread the arch, move the front teeth in, and elongate at the same time.

As it is automatic in its action, it requires less attention, and consequently produces less inconvenience and pain, which should lend value to our services.

It is equally applicable to the upper or lower teeth and may be used on both simultaneously.

It is conveniently adjusted to bring pressure to bear on the roots and alveolus, and thus has a tendency to overcome the outward tipping of the anchor teeth sometimes encountered in spreading the arch.

And lastly, it is not unsightly, since it admits of greater cleanliness.

INCLINED PLANE.

The next appliance shown is an inclined plane fixed to the teeth, for "jumping the bite" and adjusting the occlusion.

It sometimes happens in regulating teeth that the lower jaw is all at sea as regards an occlusion of the teeth. It is equally bad in two or three different positions. It becomes then a question of compelling one, and only one, closure in order to give the teeth a chance to adjust themselves to each other after nature's design.

It is particularly applicable where there is excessive overbite of the front teeth, such as usually accompanies a case of thumb-sucking.

Fig. 16 shows such a case, after the upper teeth had been brought into an approximately correct arch relation. An attempt was made to establish a correct occlusion by constructing gold crowns for the upper sixth-year molars with grinding surfaces corresponding to those on the lower teeth when in correct relation, thus allowing the twelfth-year molars, which were just beginning to show through the gum, to erupt into their proper relation. Thus far everything seemed satisfactory, but the gold crowns being removed, observe what happened. The patient instead of adopting the correct occlusion, just shown in the last picture, found the one now on the screen more agreeable and effective, thus defeating the attempt to correct the overbite (Fig. 17).

The obvious objections to an inclined plane in connection with a plate led to the application of the same principle involved in a

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FIG. 17.

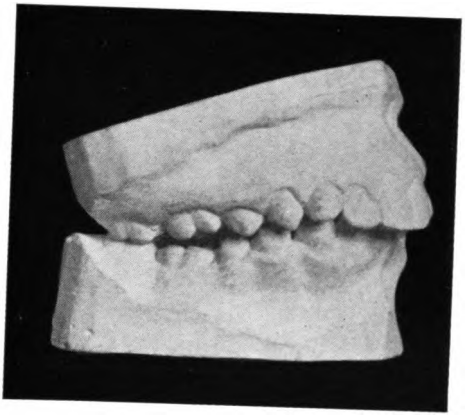

FIG. 18.

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FIG. 19.

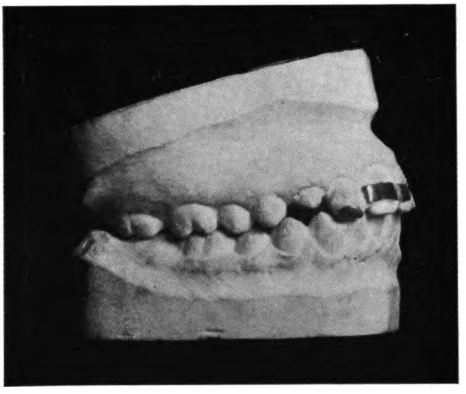
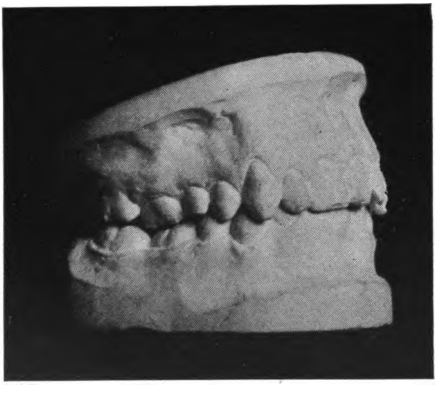


FIG. 20.



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plane soldered to bands encircling the upper centrals and to lugs engaging the cutting edges of the laterals (Fig. 18), to prevent undue depression of the centrals. This resulted in establishing the correct occlusion shown in Fig. 19.

This appliance may seem at first an uncomfortable one to wear, but this young man affirms that after the first day or two he paid no attention to it, and like reports come from similar cases.

This was the first appliance of the kind I made. I now have them made with a round wire lug to rest over the end of the lateral, as more cleanly and less likely to injure the tooth, and for the same reason have the gold dressed away from the palatal side of the laterals as much as possible to avoid contact. The bands on the centrals cover nearly the whole palatal surface and are firmly cemented on. The inclined plane surface is made from a fairly heavy piece of platinized gold plate.

Fig. 20 shows a case of a young man, twenty-one years of age, where the overbite completely covers the lower front teeth; the lower incisors badly bunched; one central having been extracted. Notice the discrepancy in the length between the front and back teeth on the lower jaw (Fig. 21, A). Both arches were spread, the lower front teeth were somewhat improved and an inclined plane adjusted, as in the previous case. This not only held the teeth apart and facilitated the regulation of the lower front teeth, but it depressed the upper and lower front teeth in their sockets, while the back teeth were free to elongate and meet each other under natural conditions. The final result is seen in Fig. 22.

The time required to produce the desired change varies from perhaps four to twelve months, according to the age of the patient and the amount of elongation to be accomplished.

Some of the teeth to be lengthened in the first case were banded with thin gold, pin-heads being soldered to the bands in such a way that an intermaxillary elastic band could be attached at night and produce an elongating pull, but this was soon abandoned as unnecessary.

The inclined plane need not, as a rule, be as wide as the one shown, and may be reduced as the work progresses. This appliance sometimes facilitates the work of the automatic spreading appliance, and may be worn in conjunction with one of those appliances on the lower teeth. It may also be incorporated with a retainer for the upper teeth such as shown in Fig. 23.

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The advantages of this appliance are, first, its simplicity—no ligatures or rubbers required. It is cleanly and effective, automatic in its action, and requires no attention from either patient or operator after it is adjusted. It is not painful, and the patient makes less complaint than the parent.

RETAINING APPLIANCE.

The next, and last, appliance to be shown is a simple retaining appliance, designed to securely hold the teeth after regulating until they have become fixed in their new position.

The requirements in such an appliance are *security, cleanliness, comfort, appearance.*

The appliance here shown (Fig. 24) combines all these to a marked degree. Like the self-acting expanding appliance (which is an outgrowth from the retaining appliance), it is composed of anchor bands with small tubes attached to the buccal sides, into which are inserted the ends of a labial wire, bent at right angles to itself. The inside wire differs from that of the self-acting appliance in that it is continuous around the arch, thus holding all the teeth that may have been moved out, while the labial wire holds the front teeth in.

This appliance is securely cemented into place and worn without discomfort.

An important and pleasing feature is the removability of the labial wire, as it sometimes happens that a young lady wishes to avoid its appearance for an evening. The wire is readily taken out and readjusted by the patient. In cases where the front teeth have not been moved in, it can be dispensed with altogether, otherwise the appliance is not particularly conspicuous.

The labial wire is usually smaller than in the self-acting appliance.

Additions may be made to this appliance, as, for instance, when a tooth has been rotated, it may be banded and the band soldered to the inside wire, thus becoming a part of the retaining appliance.

And again, when it is desired to tip a front tooth or teeth inward, moving the apex of the root outward, spurs may be soldered to the inside wire at right angles to it in such a way as to rest on the palatal or lingual surface of the root high up under the gum, exerting, when adjusted, an outward pressure, while the labial spring-

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FIG. 21.

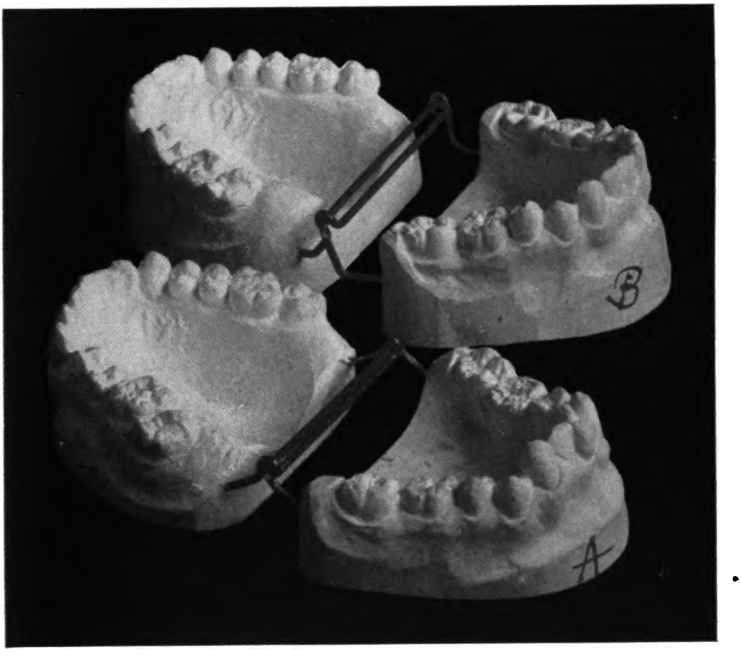

FIG. 22.

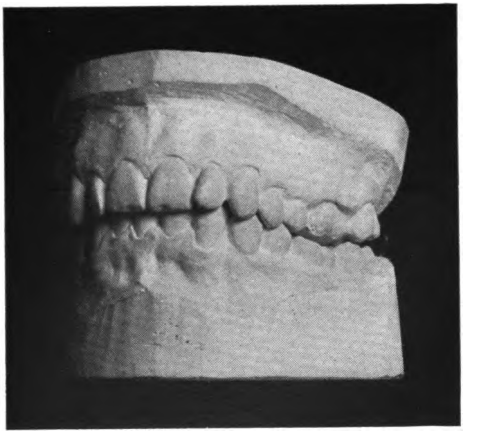

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FIG. 23.

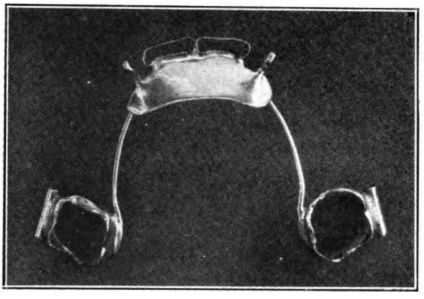


FIG. 24.

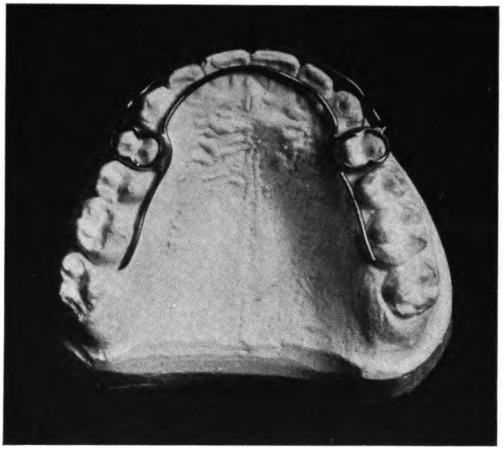
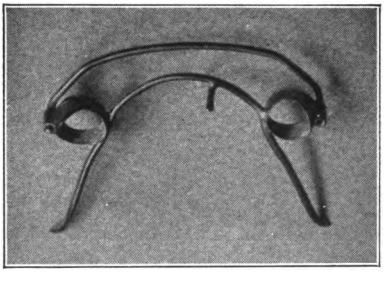


FIG. 25.



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wire is adjusted to bear hard on those teeth well down towards the cutting edge (Fig. 25). The result is obvious.

This completes what I have to show this evening, and while it may not all be new to you, I hope some of it is. It has been my desire to make the subject clear. If I have not, I shall be glad to do so later. And if any of you can derive the satisfaction from the use of these appliances that I have, it will be an added source of pleasure to me.

Dr. Sinclair Tousey, A.M., M.D., read a paper at a meeting held at his residence, March 1, 1904, on the "Radiotherapy in Pyorrhœa Alveolaris, and Dental Radiography."

RADIOTHERAPY IN PYORRHŒA ALVEOLARIS, AND DENTAL RADIOGRAPHY.

A DEMONSTRATION OF THE X-RAY, THE ULTRA-VIOLET RAY, HIGH-FREQUENCY CURRENTS, AND RADIUM, THE AUTHOR'S X-RAY TUBE FOR THE TREATMENT OF THE TEETH, AND HIS METHOD OF RADIOGRAPHY.

BY SINCLAIR TOUSEY, A.M., M.D.[1]

During the past two years a very great deal has been done with the X-ray and kindred applications as an adjunct to the mechanical and chemical treatment of the fatal disease of the teeth known as pyorrhœa alveolaris, or Riggs's Disease. During this time reports upon the subject of pyorrhœa have been published by Finsen, Custer, Parker, Hickey, Guy, Schwartz, Robin, Römer, Achorn, Suye, Talbot, Logan, Stewart, Newell, Goadby, Burchard, Ames, Grieves, Cook, Bödecker, Choteau, Rhein, Peacock, Bester, V. Wolrozynickie, and in *Dental Annals,* 1903, *Odontologie,* 1903, *Pathologie der Zähne,* 1903.

From the reports we gather that the probability is that the ordinary pus organisms, such as the staphylococcus, the bacillus pyocyaneus, bacillus coli communis, etc., have no direct share in the production of pyorrhœa alveolaris, and that the pneumo-

[1] Attending Surgeon St. Bartholomew's Clinic. Assisted by Leo Green, D.D.S., of the Dental Department of St. Bartholomew's Clinic.

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coccus is also absent. Probably a member of the yeast family is the pathogenic germ. The constitutional conditions are often due to poisoning by toxins, and a filtered broth culture from these teeth kills guinea-pigs (Goadby). The constitutional cause is frequently rheumatism or gout (Newell). The teeth themselves are generally free from caries and the dental tissues hard and highly organized. Some cases (1) arise from a primary gingivitis, with the formation of hard, scaly, dark calculi beneath the gum margin. In other cases (2) the gingivitis is not marked, early deposits may be absent, and there is phagedenic pericementitis. In still other cases (3) degeneration and necrosis of the pericementum and deposits of calculi occur upon the lateral aspects of the tooth root, the gum margin being normal (Burchard).

The clinical appearance is described by Guy in an article in the *Dental Record,* reviewed in the *Dental Digest* for September, 1903. In his patient there was chronic enlargement of the submaxillary glands; the lower incisors, cuspids, and premolars were all very loose; the gum festoons hung patulous away from them; the gums were unhealthy, spongy, livid, and almost purpuric; pus exuded freely from about the roots of the teeth; the two upper incisors and a number of roots required extraction. The teeth were hypersensitive to heat and cold, and the patient had to warm his beer and cool his tea, and was quite unable to use his teeth.

In one of my own patients, the radiograph of whose lower front teeth, taken by the process described later, is shown herewith (Fig. 1), there was such great pain all along the right half of the lower alveolar margin as to make her sick in bed for several weeks, during which time the dentist had to visit her twice a day. She came to me six months later for constitutional treatment for indefinite digestive distress, with rheumatic or neuralgic pains, and with an excess of uric acid and a large amount of sugar in the urine. This is a condition which yields to the application of high-frequency currents and vibratory massage, and these were applied over the abdomen and spine, and over the affected joints. A few applications of the X-Ray by my special tube were made to the teeth. The result is apparently a perfect cure, but could not have been accomplished without the local applications by the dentist.

Turning now to a demonstration of X-ray and phototherapeutic methods and apparatus, I call your attention to some X-ray pictures.

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FIG. 1.

FIG. 2.

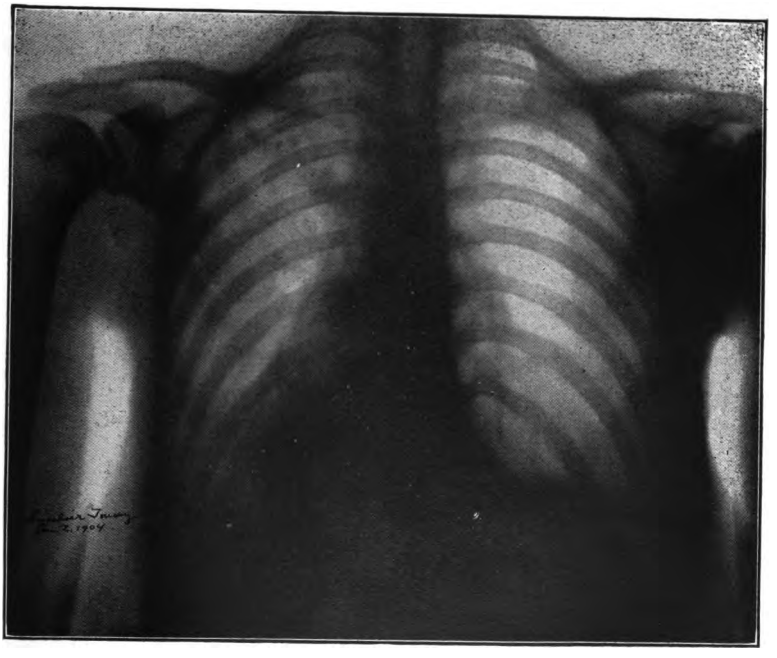

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FIG. 3.

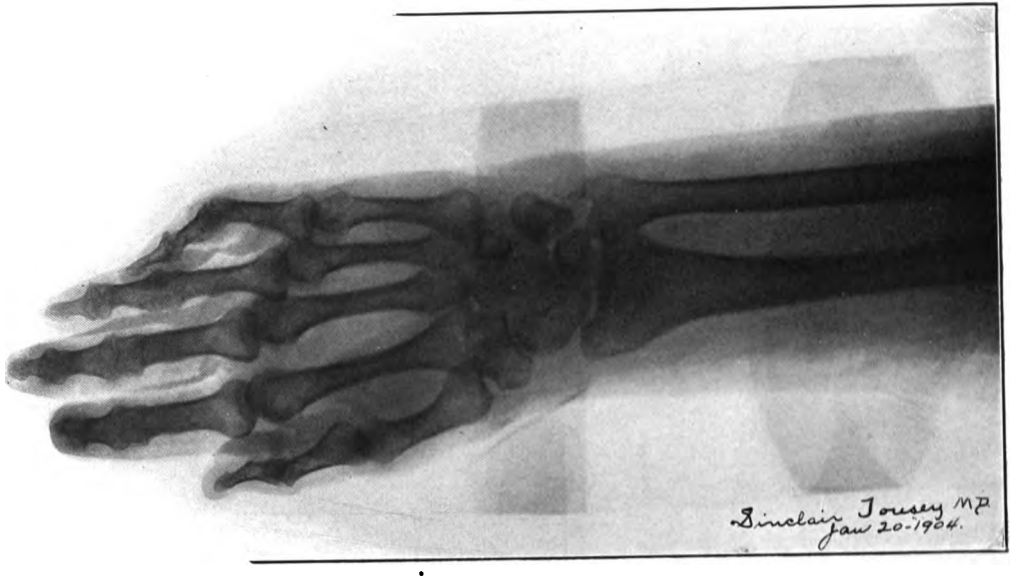

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Fig. 2 is a radiograph of the chest and shoulders of a patient whom I am treating for tuberculosis of the larynx and lungs. The picture shows the right shoulder-joint and the shoulder-blade completely, with the ribs showing through the shoulder-blade, the picture being taken from behind. It also shows both clavicles. Shining through the entire thickness of the chest, it shows the heart area, and the area of the stomach, liver, and spleen. In three weeks' treatment the expectoration, which had been so profuse as to choke her, and had been full of the tubercle bacilli, entirely ceased; and at the end of a month's treatment the larynx was examined by a throat specialist, who found that the area of ulceration and redness below the vocal cords had decidedly diminished in size and that the hoarseness of the voice had much improved. She had also gained in weight and strength.

Fig. 3 is a picture of the hand and forearm which was taken at the patient's home, she being an old lady who had sustained an injury to the wrist which was feared might be a fracture. The picture was taken to make sure that the bones were in the correct position. It was taken right through the splints and bandages. It shows no fracture, but is interesting as a beautiful picture, and also because it shows rheumatic enlargement of the finger-joints.

Fig. 4 is the elbow-joint of a patient whom I was treating for chronic rheumatism by use of the X-ray and high-frequency currents, and who has spent a quarter of his time for the last twenty-seven years in hospitals being treated for rheumatism,—being filled with medicine, having his joints baked with a temperature of three to four hundred degrees, and being treated by different forms of electricity. A few months of treatment by means of the X-ray and high-frequency currents have made a new man of him. The picture shows the lower end of the humerus with the two condyles and the olecranon fossa, at which point the bone is transparent and must be very thin. It shows the radius with its head taking part in the formation of the elbow-joint and also articulating with the ulna, and shows the ulna overlapping the radius, the entire outline of both bones being visible. The olecranon process is clearly shown.

Fig. 5 is a picture of the teeth of a young lady in whom there is such a wide separation between the upper central and incisors as to present a disagreeable appearance and cause a certain degree of hissing in the voice, and the occasional flying out of a little drop

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of saliva in the face of any one to whom she might be talking. This is a patient of Dr. Leo Green, at whose request I took this picture in order to make sure that there was no supernumerary tooth or other reason why these teeth should not be brought together. The picture shows that there was nothing between the roots, and he accordingly regulated the teeth.

For the X-ray light we get the power by means of the street current which comes into the office as a continuous direct current of one hundred and ten volts. It has to pass through an interrupter, which consists of an outer jar in which one of the lead connections drops into dilute sulphuric acid, and an inner jar in which there is another lead connection also in dilute sulphuric acid. This inner jar has a certain number of perforations which permits of the passage of an electric current from the outer to the inner plate. As soon as the current is turned on hydrogen and oxygen gas are produced by the decomposition of this liquid by the current, and bubbles of this gas block up the small perforations in the inner jar, and in that way interrupt the current. No sooner is the current interrupted than the bubbles escape to the surface of the liquid and the current begins to flow again. This interruption takes place in some of my interrupters at the rate of ten thousand times a minute, and in others still more rapidly, and thus we have a series of ten thousand currents a minute and an intensity of one hundred and ten volts through the primary coil, each one producing a current of very much greater intensity in the secondary coil; the intensity in the second coil being dependent upon the very large number of turns of wire. In that coil there are about one hundred thousand feet of wire, so that when the current is turned on full we have about one million volts in the secondary coil.

This current is allowed to pass through the X-ray tube, which contains a partial vacuum through which the current is carried, not as a tremendous spark or flame, as would be the case if the two points were in the open air, but as a very fierce bombardment of molecules which strike on the platinum disk in the centre of the tube and there break up into the form of motion which we know as the X-ray.

To see the bones of the hand, etc., by means of the X-ray, we have to employ a fluoroscope, which consists of a box into which we look, the bottom of it being coated with a chemical substance

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FIG. 4.

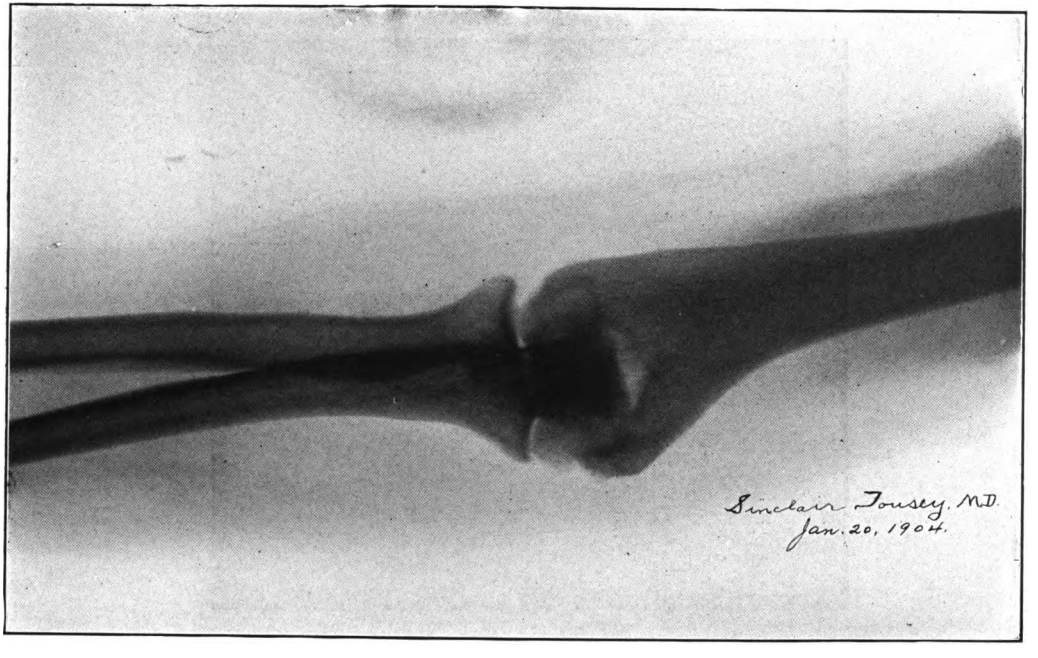

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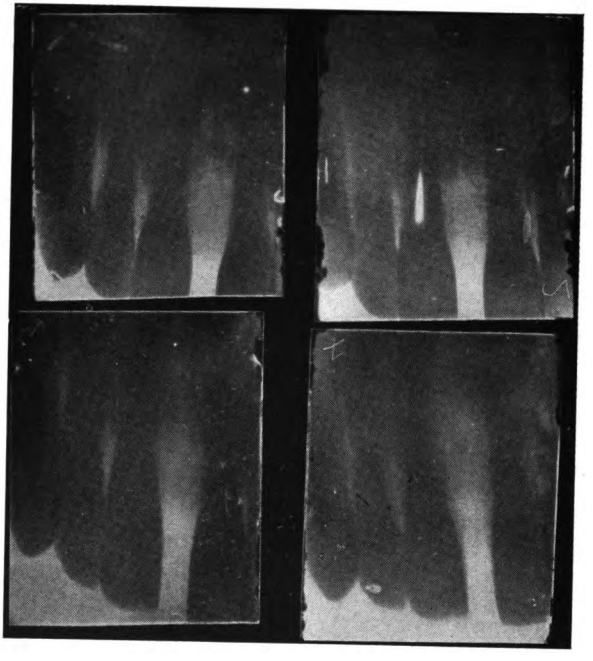
FIG. 5.



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which becomes fluorescent under the influence of the X-ray. Very often people looking through the fluoroscope will be surprised when they discover later that the bottom of the box is an opaque piece of cardboard, the fluorescence being so brilliant that it seems as if they were looking through a piece of glass. Every substance is more or less transparent to the X-ray, but the more solid substances—metals and bones—cast deeper shadows than those less solid, like the flesh, etc. A piece of glass is relatively quite opaque to the X-ray, while wood is very transparent. Aluminum is very transparent, but lead is very much less so, and very often when treating a patient with the X-ray and in taking an X-ray picture we use a piece of lead to protect the portions which we do not want exposed to the rays.

The degree of penetration and the brilliancy of the light can be regulated by means of raising or lowering the degree of the vacuum in the tube, and all of the best tubes are provided with arrangements for this purpose. Of course, the strength of the current also has to be adjusted to the purpose in hand.

The ordinary X-ray tube, which I here show (Fig. 6), has its main portion spherical and the entire half of the tube in front of the plane of the platinum disk is brilliantly lighted up by a green light. The special X-ray tube which I have devised for the application of the X-ray to the treatment of Riggs's disease is made of lead glass, opaque to the X-ray except a cylindrical prolongation, from the end of which the rays go in a straight line, and none of the X-ray goes in any other direction, the light being absolutely localized to an area about an inch and a half in diameter, and the end of the tube is so shaped as to be convenient for application to the gums. If a great many treatments are necessary, of course the X-ray, if allowed to shine through the lips, would eventually cause a loss of the hair upon the lip, so that in such cases this special tube of mine ought to be applied with the lips separated. For a few applications, or for the purpose of taking a picture, the X-ray can be allowed to shine right through the lips without any disturbance of any kind being produced.

The process by which I take pictures of the teeth, the roots of the teeth, supernumerary teeth, fractures of the jaw, etc., employs a piece of sensitized paper which is wrapped in opaque black paper and protected by thin rubber tissue; it is placed inside the mouth and pressed against the jaw, the light being allowed to

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shine from the outside of the face, and it is not necessary to use a special X-ray tube, the large spherical X-ray tube being perfectly adapted to the purpose. The distance is about ten inches, and the time of exposure required is from twenty seconds to a minute.

After making this exposure, we will take the piece of sensitized paper out of this envelope and drop it into a developing solution, and then later drop it into a fixing solution, and in five minutes we have a complete picture which may very probably show not only the roots of the teeth but also the entire pulp-cavity of the teeth extending down to the tips of the roots. In one picture, which I show you here (Fig. 7), we can see a gold crown upon the second molar, with a root filling from the same extending down about one-thirty-second of an inch into each root, instead of all the way; as it was supposed to be. The adjacent tooth, which appears to be sound, shows very perfectly the entire pulp-cavity of the root-canals. Pictures of this sort are, of course, necessary in making the diagnosis of supernumerary teeth, fractures of the jaw, impacted and displaced teeth, etc.

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I now demonstrate to you the fluoroscope which I have devised for the immediate examination of the teeth and jaws with the X-ray. It is shaped like a dental mirror, but instead of a reflecting surface has a barium platino-cyanide surface protected from moisture by a sheet of transparent celluloid, and when in use instead of a reflection of the teeth we see a complete X-ray picture covering the whole surface of the fluoroscope. For satisfactory examinations the room ought to be darkened and the X-ray tube itself wrapped in a black cloth, these precautions being taken to exclude ordinary visible light and to cause the image upon the fluoroscope to become more brilliant by contrast. Figs. 8 and 9 show the appearance of this fluoroscope.

Another patient to whom I would like to refer is a lady whom I have treated for Riggs's disease by means of the X-ray and high-frequency currents. These high-frequency currents are produced by the same X-ray coil, with the addition of a D'Arsonal transformer and vacuum electrodes. These vacuum electrodes are simple glass tubes which contain a partial vacuum. They are of various shapes and are applied directly to the surface of the body, and when the current is turned on ten thousand waves of the violet-colored light pass down through the vacuum and disappear in the body every minute.

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FIG. 6.

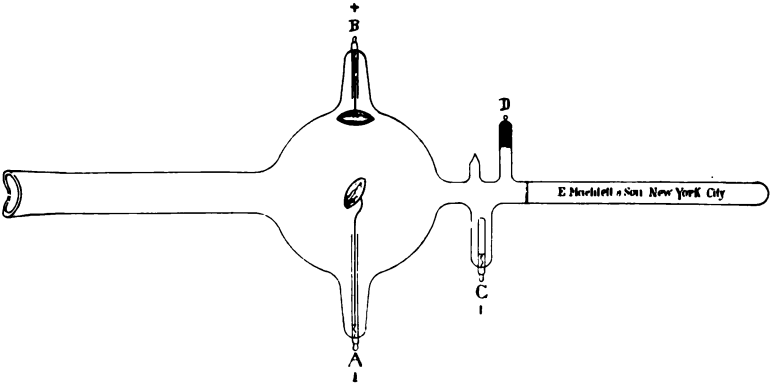

FIG. 7.

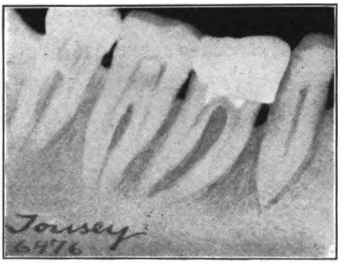

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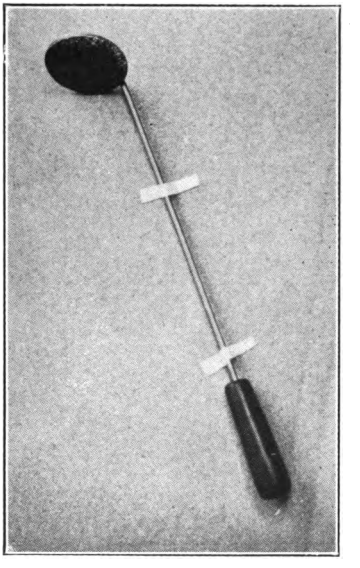
FIG. 8.



Dr. Tousey's fluoroscope for X-ray examination of the teeth and jaws.

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The test by means of Willemite, which is also used for testing radium, shows the presence of ultra-violet rays in very rich abundance in this light. From these tubes there is produced a large amount of ozone right on the surface of the body, and this is carried in by the current. The electric current itself passes into a metallic handle which is held by the patient, and when the vacuum electrode is applied to the seat of disease the current passing through the patient has greater efficiency than can be applied in any other way.

The whole application is devoid of any uncomfortable sensation. In fact, there is practically no sensation except that of the actual contact of the glass with the surface. It is used by me with very great success in the treatment of rheumatism, gout, sciatica, paralysis, neuralgia, and as an adjunct in the treatment of tuberculosis.

One case of Riggs's disease which I have treated had been treated for a couple of months by Dr. Jones, a dentist in Birmingham, Ala. The treatment had been very successful, indeed, and consisted of almost daily applications of some caustic substance which destroyed the inflamed and necrotic tissue about the roots of the teeth. This subsequently gave place to a new and firm tissue, with the loss of only two teeth. She had been suffering from the disease for some six years before this course of treatment was undertaken, and when she came to New York there was very little of the original condition to be seen, and that little had disappeared entirely under the use of the vacuum electrodes and high-frequency currents applied through the lips. At the same time this patient has been cured of an epithelioma of the face by the X-ray.

The next part of the apparatus to be shown is the lamp which produces the ultra-violet ray. This is Dr. Piffard's modification of the Görl lamp, and is actuated by the X-ray coil with the addition of the Leyden jar, serving as a condenser. The lens in front of the lamp is made of quartz crystal, and, as you see by the experiment that I show you, the light produces a brilliant green fluorescence in a piece of Willemite; but this invisible ultra-violet ray will not pass through the thinnest piece of tissue-paper, and as I interpose such a piece of paper between the lamp and the Willemite you will see that the fluorescence is entirely prevented. The same takes place when a piece of glass is interposed between the lamp and the Willemite, although light appears the same when looking at it through a piece of glass.

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The treatment of these conditions about the mouth, and also for lupus, consists in holding the lamp as close as possible to the affected surface. It seems to be something more than a merely antiseptic action which produces the benefit in these cases.

The next part of the apparatus to be seen is the Cooper-Hewitt light, a large cylinder of glass containing vapor of mercury, through which a current of very high intensity passes. The light appears white and is of four hundred candle-power, but the spectrum seems to be almost a pure violet, and anything red, like the beautiful bunch of roses which I have here, appears to be dark purple, from the absence of the red rays and the abundance of the violet element in the light. This light contains practically the chemical and life-giving properties of sunlight, about one hundred times intensified, and is applied directly over the bare chest at a distance of about four inches, and without danger of burning or discomfort. It is one of the parts of my treatment for tuberculosis.

The next part of the apparatus which I show you is the static machine, and its principal use for dental cases is for neuralgia; and I would very strongly advise any dentist, in treating a case of neuralgia apparently due to teeth, to do whatever is necessary in the way of treatment of the teeth, but not to consider extraction until the case has been treated by the static form of electricity. My own nurse suffered very much from neuralgia for two years, and two apparently healthy teeth were opened and the pulp-cavity disinfected and filled, but the neuralgia still persisted. The teeth were finally extracted, but the neuralgia continued worse than before, so that now for about a year she has suffered very much, indeed, in cold and wet weather, and has been unable to take solid food at such times. Finally, I gave her one or two treatments with high-frequency currents, which did not seem to agree with her; then about a month ago I gave her a single treatment with the static machine, which has resulted in the complete and entire disappearance of the neuralgia, although, as you know, there have been a great many cold and wet days since that time.

Now examine the specimen of radium, which, as you see, I keep in a small safe purchased for the purpose— the idea being not that I am so much afraid of losing it, as to prevent the radiation from this substance saturating everything in the room and interfering with the X-ray photography, which is so essential a part of my work. The radium, as you see, is a white powder

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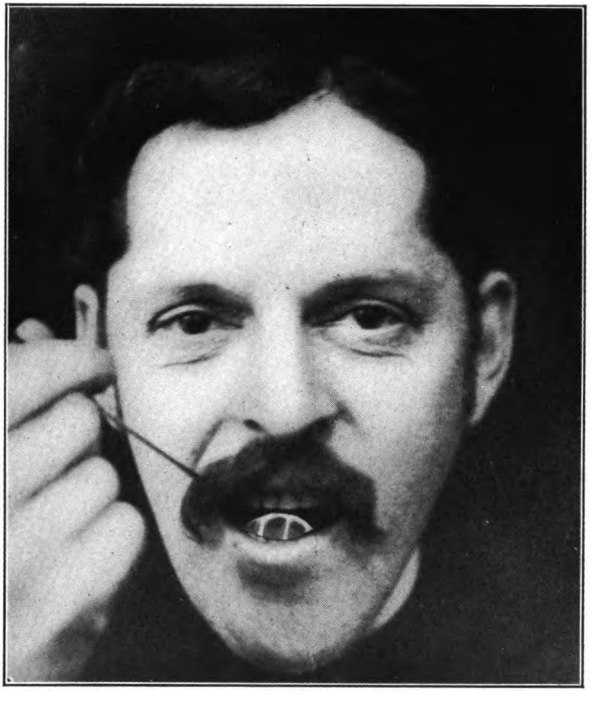
FIG. 9.



Illustrating the use of Dr. Tousey's fluoroscope in X-ray examination of the teeth.

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about one-tenth gramme in amount, and its radial activity is twenty thousand times that of uranium. Now, if we turn out the light entirely, we see a faint glow, and holding a piece of Willemite near this tube, the Willemite is lighted up quite distinctly. A diamond, which I borrow from one of the gentlemen, is also lighted up. The other day a Spanish doctor from Porto Rico was here, and we exposed his diamond to these rays for such a long time that it became quite radio-active itself, and for the balance of the afternoon, instead of looking at the bones in his hand through the fluoroscope, I caught him every once in a while looking down at this sparkler on his finger, which was glowing in the darkness.

This electric vibrator which I show you now is a very essential part of the treatment for the uric acid condition upon which so many of these cases depend. It is applied over the abdomen and up and down the spine, and acts in a certain way like massage; but the vibrations are very, very rapid, and stimulate the action of the liver, intestines, stomach, and all spinal centres. I find it of the greatest service as an adjunct to high-frequency currents in the treatment of rheumatism, sciatica, and neuralgia, and in the treatment of obesity and of sluggish portal circulation, which come to so many people after middle life if they are prosperous and have heavy dinners and comparatively little exercise. Such ladies have the pleasurable experience of going to the expense of buying new corsets after taking in the old ones about two inches; and even gentlemen often take this treatment for the improvement in their figures and the very marked improvement in their condition of physical health.

Now we will take this X-ray picture, the patient being a young lady about twenty-three years old, with two temporary teeth (bicuspids) in the upper jaw and no evidence of permanent teeth, the question naturally being whether the permanent teeth are present and ready to make their appearance if these temporary teeth were to be extracted. The X-ray picture which we take is developed right here before you without requiring the use of a dark room, and shows no sign of permanent teeth. It shows that the roots of these permanent teeth are comparatively short, absorption having taken place very much as if the permanent teeth were present to take their place. Naturally, our advice to our friend, Dr. Green, is to preserve these primary teeth as long as possible.

Another patient shown now by Dr. Green is a woman about

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thirty-five, with pyorrhœa of the lower incisors, who shows marked improvement since the X-ray was begun at St. Bartholomew's clinic a few days ago. We will now treat this case with my special X-ray tube, applying the light directly to the affected gums for about three minutes, and this will be used twice a week.

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DISCUSSION OF DR. AINSWORTH'S PAPER.

Dr. E. A. Bogue stated that he had found Dr. Ainsworth's methods such a revelation to him that, so far as he had understood them, he had adopted them in several cases. Regarding the inclined plane shown by Dr. Ainsworth, Dr. Bogue thought if it would work as well for the rest of us as it did for Dr. Ainsworth it would assist very materially in obtaining a proper occlusion in certain cases. Dr. Bogue would also like to call particular attention to these little

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tubes that Dr. Ainsworth solders to the bands. These tubes accurately fit the spring-wire they are made to hold, so that there is no lost motion and the tooth is moved exactly as desired by properly bending the wire.

In considering the three appliances of Dr. Ainsworth, it seemed proper to call attention to a few collateral facts. The first was the contraction of the upper arch. He had noticed this in examining his own models, and his attention had also been called to it by other orthodontists. Dr. Stanley had confirmed these observations recently, asserting that seventy per cent. of the cases that needed regulating had contracted upper arches. If this were anything like the proportion, and Dr. Bogue believed it to be within the limits, there was a broad field for the use of Dr. Ainsworth's appliance among persons who could not give a great deal of time to having their teeth regulated. It was also a great saving of time and attention to those who were going to do the regulating. Without claiming that Dr. Ainsworth's method was applicable in all cases, it seemed to Dr. Bogue that it was a decided advance for a great many. Dr. Bogue would give an example or two. Among the lantern slides that he exhibited before this Institute a year ago was one of a little girl whom he had sent to a friend in Paris for treatment. This friend had applied to her teeth the Angle arches, above and below, making an admirable attachment and ligating the teeth so well that the fixtures, when Dr. Bogue first saw them, had been on about ten months. He had taken careful impressions and made models of the teeth as they then were. The gain in expansion of the entire arches had been very little. He could judge of this accurately, as he had the original models, and he measured them as they were originally and as they came to him about two years later. The little girl was impatient of pressure and intolerant of pain. He found that with a single nut at the end of each screw of the expansion arch those nuts could never be kept tight twenty-four hours. The moment the teeth responded to the immediate pressure the nuts became loose and turned backward. He sent this child to Dr. Ainsworth, who put on to the upper teeth such a fixture as he had described this evening. Dr. Bogue had replaced the Angle appliance on the lower teeth, but had taken the precaution to put two nuts on the screw at each end. By actual measurement, more progress was made in three weeks than had been made in the previous ten months, and this without pain. The patient was about

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thirteen years of age. Dr. Bogue had noticed recently that a new regulating appliance had been under discussion in the American Dental Club of Paris since this child had gone back.

Another case was that of a little girl seven years of age upon whom he had placed this fixture. He had seen her again after two days and again after two weeks. The gentleman into whose hands he had sent her reported that aside from drawing a developing central incisor slightly forward, he had had nothing to do but to keep the fixtures in place. He said the case might be regarded as practically completed; for, having moved the temporary molars and cuspids and the permanent central incisor out of the way of the lower teeth, the child had voluntarily assumed the proper occlusion; and the principal upper molars, which when he began had occluded one full cusp in advance of their proper position, now occluded with the anterior buccal cusp in the buccal depression of the lower molars, leaving plenty of room for the comfortable eruption of all the remaining teeth.

It was well to notice, as Dr. Ainsworth said, that the tooth may sometimes start suddenly and come out too far. Dr. Bogue had seen three cases where the expansion arch had pushed or pulled the teeth in a direction exactly opposite from that which was intended, because the gentleman into whose hands the cases were sent had failed to take cognizance of the fact that the arch is at work the entire twenty-four hours of the day, although the patient might not be aware that it was doing anything.

Dr. Bogue would take issue with Dr. Ainsworth when he stated that the lower teeth were inferior in stability to the upper ones. It seemed to him that the teeth in the lower jaw were far more stable than those in the upper jaw, and more difficult to move.

Dr. Ainsworth made an admirable use of his expansion arch in correcting deformities in the middle-aged. If we were not discussing his three regulating appliances only, he would feel like making his compliments to Dr. Ainsworth for the case of restoration shown, the patient being forty-nine years of age.

He would like to ask Dr. Ainsworth what solder he used in making these regulating appliances.

Dr. Bogue's attention had been attracted to this method, especially for use with little children, in which cases it had shown itself to be particularly well adapted to do the work required quickly and with little if any pain.

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Dr. Bogue had been frequently asked why the permanent teeth should be so much larger than the temporary teeth they replace, and why these teeth should seem so out of proportion to the mouths in which we found them. He would like to ask a question,—Why are the feet of a pup so out of proportion to the size of the animal? Do we remove some of the toes lest the dog should seem to be all feet?

The retaining appliance shown commended itself, particularly for its cleanliness, acuracy, and comfort.

Dr. Rolof B. Stanley stated that the spirit which prompted him to take part in the discussion was born of a desire to learn rather than criticise. He had tried to analyze with an unbiassed mind Dr. Ainsworth's method of treatment of malocclusion and the application of the mechanical principle of his appliance. Dr. Stanley trusted he might be pardoned if for a moment he dwelt upon the A, B, C, of orthodontia, so familiar to all. It might serve to bring out more clearly the points he wished to make. Problems of orthodontia were problems of malocclusion, and restoration to the normal was the essential object. The first and most important step in any case was a correct diagnosis. The ability to make a correct diagnosis implied a knowledge of normal occlusion, of the fundamental types of malocclusion, and an appreciation of the harmony of facial lines. We must classify these cases and establish hard and fast rules, else the work savored of the experimental, or the operator must be guided by instinct alone. The only part individuality played in any case was in the degree of deviation from the normal. We could never bring order out of chaos if the individuality of the patient, as well as that of the operator, was allowed to play so important a part to the exclusion of fixed rules. With the knowledge of the normal occlusion and of the fundamental types of malocclusion, the deviation from the normal could be seen at a glance. It was the position of the teeth collectively that we must first consider, then the teeth separately, and an appliance should be chosen that would embody, in the order named, efficiency, simplicity, and inconspicuousness. Under the head of efficiency, the ideal appliance was one of standard pattern, no matter what the pattern might be, which would meet all the requirements from start to finish of all forms of malocclusion, and exclude the necessity of mechanical skill and ingenuity on the part of the operator. By simplicity was meant not only simplicity of mechanical construction, but free-

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dom from an array of modifications or additions necessary to effect all changes in a given case, for the farther we wandered from the straight and narrow path of one fixed appliance the greater would be the confusion in the mind of the operator.

To consider the appliances shown, Dr. Stanley failed to see where they covered all the requirements, or how they were capable of accomplishing restoration to the normal in all cases. That they would bring about results in certain cases was proved by some of the photographs shown, but he doubted if they were available for all forms of malocclusion. For instance, where it was necessary to lengthen one or both lateral halves; where it was necessary to expand but one lateral half; where it was necessary to contract the lateral halves. Or, in the use of the inclined plane, how could the mesio-distal relation of the molars and bicuspids on one side only be restored; or in a case where the lower molars and bicuspids on one side are mesial or anterior and on the other distal or posterior to normal; how could the normal occlusion be restored by the use of the inclined plane or by any appliance or combination of appliances shown to-night? Dr. Stanley could cite many other cases that had come to his mind while listening to the paper, but thought these sufficient to emphasize the points he wished to make. They were all possible cases and cases that he had had in his practice during the present winter.

The question of discomfort to the patient and the length of time of treatment was of some moment. He believed in making orthodontic treatment as easy for both patient and operator as possible, both in application of the appliance to the teeth, the force used, and the time consumed, but he did not believe it to be of advantage to allow the patient to operate the appliance at will, since he did not appreciate the normal conditions. In conclusion, efficiency had been sacrificed in applying the principle of the expansion arch in the manner shown. While in some cases the ligature had been done away with to simplify the manipulation of the expansion arch, in as high as seventy per cent. of cases its use was required, either for carrying the incisors forward or for rotating them. Again this appliance presupposed that each tooth in the lateral halves was to be removed equally, which was far from the case generally. So with the inclined plane, the device might restore normal mesio-distal relation where both of the lateral halves required it, but could not where but one of the lateral halves required

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it. Cases of this type were as frequent as the bilateral. To meet all conditions, no matter how extreme, with one form of appliance certainly simplified treatment and promoted proficiency in its use.

Dr. J. Bond Littig was gratified to hear such a paper, and was going away with something new. He would especially commend the movable character of the appliance for retention. He thought there was great danger in an appliance impossible of removal. He had had two cases at least where, although thorough instructions had been given as to the proper cleansing of the immovable appliance, there had been a certain amount of disintegration of the enamel.

As to the inclined plane illustrated, Dr. Littig thought one principle was applied here that he had never seen before. We had all used the rubber plate, thickened in front to reduce the lower teeth or lengthen the molars, but he had never seen an appliance whereby the upper and lower teeth could at the same time be shortened.

Dr. C. F. Allan said that the paper had been most interesting to him. That effectiveness, simplicity, and cleanliness were salient points called for in all regulating and retaining appliances, and Dr. Ainsworth possibly more than anybody had attained these conditions. His only criticism would be the name of the paper. It seemed to him that the terms occlusion and malocclusion are much more properly descriptive of the conditions under consideration.

The inclined plane attached to the teeth of the upper jaw was the most individual of all the valuable appliances Dr. Ainsworth had shown, and Dr. Allan expected to put it in use immediately. Dr. Allan expressed his thanks to Dr. Ainsworth for the many good points he had given.

Dr. J. Morgan Howe, in expressing his gratification at the instructive paper, thought Dr. Ainsworth had presented an entirely new method of the application of springs. His own experience was that the movement of teeth by means of metal springs was the least painful of any of the various methods except the screw. The screw, however, requires more attention. Dr. Ainsworth's method certainly accomplished results in an easier and quicker way than those in general use. Whether or not it was universally applicable, it had added a new means of applying force and accomplishing results in certain cases at least. All of the

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presentations Dr. Ainsworth had made had been most interesting and instructive.

Dr. C. F. Allan stated that he wished to call attention to the necessity for always cementing on any appliance to be worn in the mouth and which cannot be removed for cleansing.

In putting on bands the teeth should be smeared with cement as well as the bands, and that this was imperatively necessary to prevent the possible rapid disintegration of the teeth over which appliances were placed, and in this matter one could not be too particular.

Dr. Bogue agreed with Dr. Allan regarding the cement under the bands of regulating and retaining appliances. He recalled one case at least from an exceedingly eminent orthodontist where, had the teeth been in his own mouth, he would rather have had them in any condition of dislocation than in the condition in which he found them. Dr. Bogue was not impressed with the fact that this appliance of Dr. Ainsworth could be removed to permit of a good appearance when the young lady went to a party. It was liable to form a habit that might be indulged in at other times.

Dr. Ainsworth, in closing the discussion, stated that he wished to disclaim all intention of developing a system of appliances to take the place of those now in use, or supplying them commercially; that he believed, as a rule, the appliance should be especially made for the case in hand. He had come here in response to the solicitations of members who were acquainted with what he was doing, to show what experience had dictated to him as improvements in the conduct of some cases. It had been claimed that seventy per cent. of all regulating cases required expansion of the arch. He thought this a sufficient apology for his demonstration of a self-acting appliance to do this work. Dr. Ainsworth had stated that this appliance was under the control of the patient by removing the front wire, but practically it was a control seldom exercised, as the appliance was so comfortable. It was very different from a rubber plate or an appliance that interfered with the functions of the mouth. It had been his experience that with such appliances the patient left them out much of the time.

These appliances were not perfect. The ideas were offered with the hope and belief that if intelligently applied they would be found to possess much merit. The principles might be applied in connection with other devices.

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Dr. Charles O. Kimball, in proposing a vote of thanks to Dr. Ainsworth for coming on from Boston to give us this demonstration of his method, wished to call attention to two or three points; in the first place, to the simplicity, efficiency, and cleanliness of his apparatus, and no less so to the clear and simple and remarkably terse way in which he had demonstrated it by means of his photographs and his paper. Dr. Kimball would move a vote of thanks from the society to Dr. Ainsworth.

Motion seconded and carried.

Adjourned.

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A REGULAR meeting of the Institute was held at "The Chelsea," No. 222 West Twenty-third Street, New York, on Tuesday evening, April 5, 1904, the President, Dr. Brockway, in the chair.

There being no communications on theory and practice, the paper of the evening, "A Plea for Thorough Dental Education," was read by Dr. Leo Green.

A PLEA FOR THOROUGH DENTAL EDUCATION.

BY LEO GREEN, A.B., D.M.D.

THIS paper presents at its inception a rather discouraging aspect. The subject is so broad that it is difficult to limit it to a short paper, and yet the omission of a single phase would seem to disturb the sequence of ideas. I expect to bring up some questions that have caused no little difference of opinion in the past, but yet I want to make it clear that I am not bringing an indictment against any one institution or individual, but am merely trying to indicate the faults in the general system of dental education as I see them.

The first part of my paper will deal with the preliminary education of the student and his preparation for entrance into the professional school. I will then pass to the instruction in the dental schools and examine the methods there in vogue, both as to the theoretical and clinical training. We will then discuss the examinations for State licenses, and some professional ideals (or want of them).

But to return to the preliminary education of the dental student, and by that I refer to his mental and manual training prior to his entrance into the professional school. I regret to say that the present method of preparation for our professional career is entirely inadequate, and that the average dental student has no better education than the average clerk. In fact, a large proportion of our dental students have been unsuccessful in a mercantile career and start in, quite late in life, to study dentistry as a last resort. Hurried preparation in a cramming school, or with a tutor, enables them to pass the entrance examinations for the dental schools, or to satisfy the requirements of the State Board of Regents. Or,

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on the other hand, we find our material in the short course students of the high schools.

Since I wrote this paper, it was my good fortune to be presented with a copy of an article written by Dr. Harry Carlton, dean of the Dental Department of the University of California. I quote from his article as follows:

"How few professional schools have entrance requirements that amount to much; they may have requirements that look well in the catalogue or annual announcement, but most accept without question or investigation certificates from teachers or obscure preparatory schools, and the like. There are approximately sixty dental schools in America. To quote from a recent compilation, three have no express admission requirements; eighteen have purely grammar-school subjects for entrance; eighteen more, first year standing in high-school work; eleven have requirements covered by two years of high-school work; and six require a three years' high-school course; none of them, as much as is required for admission to any reputable college."

A man undertaking the study of any profession with such a foundation is very much handicapped, unless he is an exceptionally capable student. No officer enters the united service with so little training as our own students exhibit, unless he is on very friendly terms with the administration. No engineer, or lawyer, or teacher prepares for his life's work by the short route. We cannot erect a building on a soft foundation, and cannot turn out an educated, liberal-minded man, be he lawyer or dentist, with a professional education imposed upon mental unfitness. For our average student the study of anatomy, physiology, chemistry, and bacteriology presents a difficult and disagreeable problem, and a lack of respect for the laws of hygiene and pathology remains with him in later years of practice.

The higher classes of professional schools are beginning to demand a college degree as a requisite for admission, and we must soon fall in line. The advantages of this standard must be evident. At present our schools require only what the law demands, and in the case of foreigners or man intending to practice abroad, many concessions are made. A man is prepared, in a measure, to study any profession when he has received a college education. He is all the more prepared to study any one profession when his education has to some extent been shaped to that end in view. If his

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fingers as well as his mind have been trained, then has the prospective dental student received an almost ideal preparation. When a student enters Columbia University, for instance, with the ultimate intention of studying medicine, he takes the prescribed college courses and chooses such elective subjective as will be helpful to him in his medical course. At the end of three years, he is ready to enter the medical school, with a good education, ability to study and grasp new facts, and, if he has chosen his electives wisely, with a fund of information that will lead up to his medical training. The future dental student could likewise take up such elective courses as would assist him in his dental studies, and, furthermore, apply himself faithfully to manual training, to educate his fingers. Dr. Maurice Richardson, the famous Boston surgeon, attributes his skill to early training at the forge; and I have frequently heard surgeons attribute their dexterity to training in wood work, carving, painting, etching,—in short, to various forms of manual training.

You will say that this long college training entails too heavy a burden and expense upon the poor student. For the benefit of the multitude, the individual must always suffer; and yet, with the many scholarships and opportunities for self-support that our colleges offer, the ambitious student is rarely barred from an education because of his lack of means. For a simple dental operation no great learning or manual skill is necessary, but to keep in touch with the progress of dental knowledge, and to maintain dignified relations with the medical profession, a higher mental standard for our students is imperative. The lack of courtesy, or recognition (so called), from the medical profession of which dentists so frequently complain is due largely to a lack of confidence. Laymen as well as professional men are wont to look upon us as mere skilled mechanics. It is only within the past few years that the government has added dentists to the military service; and the rank of these contract dental surgeons, as compared with the collateral branches of the service,—the medical, the legal, and the clerical,—is not one to be proud of. We have been slow in making the public see the importance of our services, because we have been slow in educating ourselves. The greatest enemies to our professional progress are those men whose slogan is, "Too much theory and too many lectures." If their theory is correct, our schools are unnecessary; an apprenticeship in the office and me-

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chanical laboratory would suffice. We must sooner or later realize that so long as our educational standards are low, so long shall we fail to attract a superior class of men to our ranks. Dr. Carlton, in referring to a paper written by Dr. Kirk and printed in the *Dental Cosmos,* says,—

"He also refers to the demand now being vigorously made from many quarters, that dentistry be classed as an 'independent' profession and given equal status in the specialties of the healing arts. I quite agree with him that much, aye, very much, remains to be done before that recognition, as such, can be accorded. If we would have the respect and regard of other professions we must first respect ourselves. Dentistry should be a full profession and recognized as such, but it only will be when the character of the men who comprise it bring its recognition up to what it should be. The conferring of the dignified degree of Doctor upon men of deficient culture is wrong, and for this reason we fail of recognition not only abroad, but at home. I have said that any increase in dignity and professional status must come from within the great body of the profession itself. To gain these ideals and make the profession what it should be a high grade of young men must be attracted to its ranks. As soon as the best men are attracted, excellent work will really be done, and the development will then be a natural one."

The announcement of a four years' dental course looks imposing in print, but does it really indicate an *advance* in dental education? Until recently, a "year" in most dental schools consisted of five or six months; and terms of more than seven months are still rare. The course of instruction and corps of instructors as represented by many schools in their annual announcements are a delight to the eye; but how different is the reality. Some few schools there are whose faculties plan out a nine months' course, and faithfully carry out this schedule. But is it not natural that students will flock to those institutions making the least demands of them in the way of time and effort? The history of our dental schools during the past twenty-five years has had its full measure of scandal. The disclosure of fraud and the sale of diplomas have incurred for us, from time to time, the distrust of foreign authorities. Less than ten years ago the State authorities were called upon to admonish the officials of one of our local institutions for neglect,—a neglect which nearly resulted disastrously for the in-

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terests of the students. Of course, exposure and official prodding have accomplished much in the way of reform, but there is still much to be desired.

An unwise feature in some of the courses is the unnecessary repetition of lectures. Men are called upon to listen to the same sets of lectures several years in succession. A lack of interest and a tendency to cut hours are the inevitable results. Such courses seem to be designed to prepare men up to the hour to pass examinations, which is not the ultimate end of education; it should be merely a feature. And yet the lectures in operative and mechanical dentistry are far superior to the clinical training in these departments. The demonstrators are for the most part inexperienced, recent graduates, for whom the ridiculously small salary is some inducement.

Furthermore, the students are wont to look upon the lecture course as a necessary evil, and as independent of and unessential to the clinical training. If this is not a fault of the system of education, at whose doors shall we lay the blame? The requirements in the actual practice of operative and mechanical dentistry are for the most part inadequate. There are other faults of the system of education to which I could call attention, but time and space prevent me from going into details. I must, however, take advantage of this opportunity to call attention to the questionable practice of permitting students to substitute apprenticeship instruction in operative and mechanical dentistry for the regular college courses in these departments.

Now, as to the annual examinations; the number of failures in the last year is so large, as compared with those of the previous years, that we naturally look for an explanation. The trouble seems to be that the examinations of the first two years are conducted in too loose a manner, and that the weeding-out process occurs only at the eleventh hour. College authorities should indicate to the impossible student, at the earliest opportunity, that his sphere of usefulness lies elsewhere.

Under the present condition of varied efficiency of our dental schools the addition of a fourth year will not produce a new era in dental education. We see in the rulings of the National Association of Dental Faculties the same error that underlies the workings of the labor unions. If all men were of equal ability, the labor union system would be fair; but it is manifestly unjust to

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be obliged to pay the poor workman at the same rates as the skilled, or to require the sluggard to work only as many hours as his more diligent brother and for the same hire. As it is with men, so it is with colleges. The National Association classifies the thorough institution with the lax one, and lays down a general rule for them all. It is fair to presume that you can learn more about dentistry in nine months than you can in seven; and you must expect better results from an institution which maintains a high standard equally to all, than from one which lets down the bars so that the lame sheep can pass through. Besides, the entrance requirements of some institutions produce a body of students capable of learning and thoroughly assimilating more in one year than those of another institution in two years. I am not opposed to a four years' dental course; under certain conditions I believe such a course would be admirable, and I will attempt to outline these conditions. Start with students *properly qualified to study a profession.* Insist upon their preliminary education being of a high standard and in a measure preparatory to their prospective training; this will enable the college faculties to eliminate such courses as chemistry and physics, which now form part of the dental curriculum. At the end of three years examinations for the degree may be held and successful applicants rewarded accordingly. For the fourth year I would outline a course of clinical work. You may ask, What will be gained by dividing the course in this way? After the student has received his degree, he is relieved of the worry of examinations and attendance at lectures, which, in a measure, must conflict with his clinical work. His opportunities for observation will be broader than before, and unhampered; and any taste for original research can be fostered. The results altogether will be for the good of the public, as well as of the individual.

One of the features peculiar to our form of government is the sovereign right of the State to make laws for its own government. While this has many advantages, it likewise has its disadvantages. A notable instance of the latter is the conflict of the divorce laws, which has brought both trouble and ridicule. The lack of uniformity of the laws regulating the practice of medicine and dentistry in the various States is also to be regretted. This difficulty could be remedied by a national standard of examination, which should be no less exacting in its requirements than the most rigid

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tests now in force. The English system, whereby a licentiate under the home law is permitted to practise in the colonies, seems eminently fair and is certainly consistent.

Too many of our practitioners suffer from a want of self confidence and individuality, which in itself is a confession of poor training. Men are too apt to accept, unquestioned, the results that others offer; new drugs or patent preparations are readily accepted as a panacea for all ills. Moreover, we have been afraid in the past, to cry out against the commercial tendency in our ranks. We have failed to distinguish the men who labor for the benefit of the profession above those who work only for their personal profit through the dental supply houses. We are either too indifferent to this condition, or else too many of us are involved in these commercial transactions. It is difficult to make many of our men understand that, while they may have a legal right, they have no moral right to conceal from the profession any useful ideas expressed in the form of new drugs, formulas, instruments, or methods of operation, or to market out the products of these ideas after having secured them by patents. Do these men ever stop to consider how slow would have been the advance of our professional knowledge, and how little they would know to-day, if all progressive thought had been veiled in secrecy or inventive genius had invested its products with patents?

The worst feature of the commercial tendency—and the most degrading—is the rapid growth of the advertising dental companies. A representative of one of our local newspapers recently asked me what form of legislation could be invoked to drive these parasite growths out of existence. Legislation alone could take care of present conditions, but the bright hope for the future lies in education. Education will take care of this and other degrading tendencies in our profession,—that I have already indicated. As regards legal enactments, I would like to quote the English law. Every candidate on being admitted as a licentiate subscribes to the following declaration:

"I do solemnly and sincerely declare that I will exercise the several parts of my profession, to the best of my knowledge and ability, for the good, safety, and welfare of all persons committing themselves or committed to my care; and I hereby promise as a Licentiate in Dental Surgery, that I will not advertise or employ any other unprofessional modes of attracting business, nor will I

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allow my name to be connected with any one who does so; and that I will loyally obey all by-laws of the Faculty made or to be made for the Licentiates in Dental Surgery."

"Any Licentiate who may be proved, to the satisfaction of the Council, to have violated the obligations in the foregoing declaration shall, if the Faculty so decide, render himself liable to the forfeiture of his diploma and to his name being erased from the list of Dental Licentiates."

Some such legislation might be enacted to advantage in this country.

In closing I wish to pay tribute of my respect and admiration to those institutions which have stood for higher dental education, and to those men of the present and past generations who have devoted their best efforts for the benefit of their profession and mankind.

DISCUSSION.

Dr. Eugene H. Smith.—I am in full sympathy with that part of Dr. Green's paper relating to more thorough preliminary training. I would like first, however, to say a few words relative to his criticism of the conduct of the dental schools. The errors he points out are in the main true, but there is a good reason for these errors. First, as to the repetition of lectures. I find this repetition is necessary with the present class of students. I have had a chance to study this question thoroughly, having had to deal with students presenting widely differing degrees of preliminary education, from the minimum requirement to the man who has his college degree. I have asked these different men as to the wisdom of repeating lectures. In every instance the college man has replied it was unnecessary,—that he did not need to have the same thing told him twice. The poorly trained man invariably says, "I was unable to properly grasp the subject at first." I think, however, that there are very few colleges to-day that repeat lectures three years in succession. Most colleges repeat the junior and senior lectures. The correction of all this is a higher preliminary education.

The essayist speaks of the substituting of apprenticeship in an office for college work. This does not exist in any of our colleges, so far as I am aware; certainly not in Harvard. He also speaks of annual examinations, and the large number of failures in the last year as compared with other years. I can only say that this

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is not so in my experience. We generally register a class of fifty members. The first year is their Waterloo, because they are taking anatomy, physiology, histology, bacteriology, and physiological chemistry along with the medical students in the Harvard Medical School. Of this number as many as thirty per cent. fail in a majority of their examinations. If a student successfully passes his first year he is a very good man.

Another criticism was that of employing young teachers. I think every dean who has the selecting of instructors will bear me out in saying that the average graduate of twenty years ago is not a fit man for an instructor in the present dental school. While it is desirable that we should have men more experienced in practice, still such a man is apt to have many hobbies. He is set in his methods, and is apt to be a dangerous man for the young student to meet, but a most valuable man after the student has become more matured. Then again it is difficult to get the older men as teachers. They are busy men, and every hour they teach is a financial loss to them, more so in dentistry than in medicine. The dental man who gives his time to charity or to teaching does it at a greater cost to himself than does the medical man.

The essayist says that the college authorities should make it plain to the impossible student, at the earliest possible moment, that his sphere of usefulness is elsewhere. I think the majority of men who have charge of the education of students do this very thing. It is a difficult matter, however, to determine. Many men who do discouraging work to begin with turn out to be first-class men. So a teacher takes a great deal upon himself who says to a young man, "You have missed your calling; your field of usefulness is elsewhere." Again, the student may think otherwise.

The essayist speaks of the habit of practitioners concealing useful ideas. The men with whom I have had the honor to be associated have been perfectly free with their ideas, and their laboratories and operating-rooms have not been locked to their fellow-workers.

A proper preliminary education is essential to any professional education. There certainly can be no question about that. The only difference of opinion that can exist is as to what that preliminary education shall be. Some go so far as to say that the practitioner in dentistry should receive the same education as the specialties in medicine; that the dental practitioner should

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have a medical degree. There is strong logic in their arguments, and it may come to this. On the other hand, we will find other men, like our essayist, who will argue for a college training. I feel that I can enter upon the discussion of this subject without prejudice, as I hold but the one degree, that of dentistry. As far as my experience as a teacher goes, I have invariably found that the man with the right kind of a college training makes the best dental student, and can do more work in a given time than the man can whose preliminary training is represented by two years' work in a high school. This being true, it follows that with high preliminary requirements, and a college course of three years of nine months each, much more can be done in the way of advancing our professional standing than can be accomplished in a four years' course with immature and improperly trained men.

Dr. B. Holly Smith.—There are some misstatements in the paper as to the actual facts, unless the essayist has inside information of which I am not possessed. I have been a teacher for twenty-one years and am a member of the Association of Dental Faculties, and I stand here to-day to say that the system of dental education in this country is not faultless, but it is in every way far above that described by your essayist. I know of no lax treatment of foreign students. Do not we have associates appointed in all the countries of Europe, and are not we more jealous of the good behavior of men who go abroad than of any other class of students? So it seems unfair that we receive this statement as an absolute fact.

As to our preliminary training. Why does not this organization appoint a committee to formulate a proper plan? Do we not resolve too much? Do we not discuss too much? Let us *do* something. Every one of us knows that the dental student should have a special preliminary training. What we need to determine is what that special training ought to be. It would seem desirable that instead of the language courses now necessary for college entrance, a course in manual training be substituted for those students contemplating entering the profession of dentistry. It seems to me here in your Columbia University such a course might be given, not unlike the course for students in medicine. A kind of manual-chemical-physical course. We do want more finger-work. We want training along certain special lines. Now, instead of discrediting those who hold for a four years' course, why not

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allow anybody who has secured an A.B. degree in the chemical-biological course a credit of one year of that four years' course? The proposition of the essayist as to a nine months' school year does not at all meet with my approval. I would say broadly that there are two distinct propositions made in the paper that I should oppose. First, I do not favor an A.B. degree, excepting one along the lines of the student's life work. Otherwise it is wasted time. Secondly, I am opposed to a nine months' course. I grant that in Boston, where pupils are not subjected to any great changes of temperature, they can manage to work for nine months. But this cannot be done in the Southern States. Take Atlanta, Louisville, or Nashville. It is simply impracticable. Then again, many of our dental students are self-supporting, and it is necessary for them to have the interval between sessions to secure the wherewithal for a return to college. I do not at all agree with the essayist when he says that a greater part of our dental students are men who have tried mercantile pursuits and failed. It is not so in Baltimore, and I do not believe it is so anywhere. A large percentage are men who are much more capable than the average salesman or clerk. I have never heard of any credit being given a student for laboratory or office work. Certainly it is against the rules, and I rather think the essayist is mistaken. Dr. Smith says that the time is not yet ripe for an A.B. degree. It never will be ripe for such an A.B. degree as many of the colleges are granting. Is it not some evidence of education to have secured the degree of D.D.S.? Is it not necessary that a man should study, should read, should think, should experiment; that he should use his hands? Certainly this all-around training makes him a larger man than would development of the mental faculties alone. I have known college graduates who could not take the bridle from a horse, who did not know how to open a gate. The dentist is to-day in my judgment the most resourceful man in the world. So far as recognition is concerned, it bothers me not at all. It depends upon the individual whether he is recognized or not.

Dr. Edward C. Kirk.—I wish to speak about some things that have been touched upon and also about some things that have not. I know very little about the majority of dental schools, but I am surprised to learn what I have to-night,—that they are in such a state of degeneracy. I was very much interested in the suggestion for a definition of what constitutes a high educational stand-

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ard. I have written something about that and said something about it, and I would like to get in the minds of my professional colleagues this idea that there is a difference and a great big one between the quality and the quantity of an educational standard, and its adaptability to a given purpose. I quite agree with Dr. Holly Smith when he says that any old A.B. degree will not do. It must represent a certain kind of training adaptable to the purpose of preparing a man for entering upon the study of dentistry.

The question of a Latin requirement has been touched upon. I hold that a year or two years of Latin is insufficient except for the discipline which any study affords. Other than the discipline common to all education, Latin is valuable for two purposes, either for the study of Latin literature or as a side-light upon the study of English. On the theory of Goethe, that he who does not know a foreign language does not know his own, how much does a student get out of one or two years of Latin? Of how much value is it as a preliminary training for admission to the professional study of dentistry? I wish to quote some extracts from a correspondence with a well-known gentleman regarding the uses and purposes of Latin as taught in our schools. "So far as I have ever seen, the training of Latin in the preparatory schools is as bad as it can be. It was bad in Milton's time, and the faults that existed then seem to exist now." I was present at a commencement when the president said, "Qui gradum doctores dentarii accedunt," but not one of the students knew enough of Latin to go up and get his diploma. That might have happened in any dental school under the present entrance standards. If a man does not know enough Latin to come up and get his diploma when he is asked to do so in Latin, of what use is it to him. In order to get the use of Latin a student should have a dozen years of it; he would then be in a position to read Latin literature and would understand his English better. I heartily agree with Dr. Smith, of Harvard, that the man with the college training is the better man all round, and personally I am sorry that the opportunity was not given to Harvard University to try this experiment which they are determined to try independently of the Association of Faculties. The objection that I have to the position as expressed by Dr. Smith is that this is the ideal which he thinks ought to be attained by all colleges. I want to have this recognized, that we are not making soldiers. We

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have no such thing as a system of dental education. We have, instead, systems of dental education. We are not duplicating and multiplying men of the same caliber or capacity. Some must become strong in certain ways, and they will necessarily be weak in others. I believe there is room to-day for an institution that will try just this experiment that Harvard University means to try, but on that account it should not be said that as it is good for a certain number, therefore everybody must do the same thing. This special training will be manufactured into that thing called culture, and there is undoubtedly room for a great body of such cultivated men. But do you suppose they are the best men to serve the public everywhere? I do not think so. Such a man will naturally gravitate to the cities where culture abounds, and where he will be in sympathetic touch with those of his own class, and he would be unhappy in any other environment. From this class of men will doubtless be produced investigators and teachers, and of both these we need many. But there is room for a much larger number of men who will be empirics. The average medical practitioner, when asked why he treats a case thus and so, will give you an answer based on the rule of thumb. There is room in my judgment for that larger class of men who have only the preliminary education furnished by the State to practise among that class of people commonly spoken of as the "common" people. A man who is in sympathy with them. Then again there is a great class of men who are unable, because they are brought face to face with the bread-and-butter problem, to go into the field of education beyond that which the State furnishes. Indeed, the high school furnishes a very good training to-day. Who made dentistry; was it college graduates? I think not. Or if some of our dental pioneers were college men, is it not true that the average A.B. of thirty-five or forty years ago is no better educated than the high-school graduate of to-day? So I think it is a wrong method to make an A.B. degree a necessary qualification for entrance into the dental profession.

The essayist, with a wave of his hand, dismisses the whole subject of State sovereignty, saying that this difficulty about interchange of licenses could be overcome by the creation of a national standard. Certainly it could, but that involves an amendment to the Constitution of the United States, and that is a question affecting State sovereignty, which is a very difficult problem. The last

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time that State sovereignty was practically considered in this country was in the early youth of most of us, when several hundreds of thousands of able-bodied men laid down their lives in the discussion of it. I do not believe there can be any such amendment making an obligatory national standard possible, however desirable it might be.

As to the question of commercialism and what the essayist has designated as English law, I doubt if it is English law. What he has quoted is merely a contract. It might hold under English law, but I doubt if it would hold here.

Dr. Faneuil D. Weisse.—I am an optimist in the full sense of the word and especially so with regard to what the dental institutions of this country have accomplished in establishing dentistry as a profession. I look upon all plans as regards preliminary education as unnecessary, as it has had and is going through its natural evolution, in spite of sporadic spurts by individual institutions. In New York State preliminary educational requirements to enter the profession have been steadily progressive since 1894, and every step forward has been conservative and permanent, with the exception of the experience of 1897, when it was realized that the advance to a 48-count requirement for dentistry was premature.

The way of the dental institutions of the United States has been hard, indeed, as they never have received from contributors to the dental journals any encouragement or commendation for their work. On the contrary, the dental journals of the country give us periodical freshets of articles criticising straw-like shortcomings in the general work.

Turning from the minor details of college work criticised by the author of the paper, let us realize that the present status of dentistry as a profession is due to the aggregate results of the work of our dental institutions.

The calling of the practice of dentistry has been a profession little more than sixty years; before that it was only a handicraft.

No calling is a profession until institutions have been established with a defined scientific curriculum for education and training for its practice. Surgery was at one time a handicraft, and the surgeon was the servant of the physician and only became his peer after medical institutions had made provision in the medical curriculum for his education as a surgeon.

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The birth of the calling of dentistry as a profession was at the sending forth, with the degree of D.D.S., of the first class of the Baltimore College of Dental Surgery, in 1841. Since that time the other dental institutions of the country have been established to educate for a profession.

Some critics have held that the creation of the degree of D.D.S. was a mistake; that all practitioners of dental surgery should be practising under the degree of M.D. To my mind the phenomenal growth of the dental profession is due to the fact that the degree of D.D.S. was created, and that a scientific curriculum for education to enter its ranks was evolved independently of the M.D. degree, thereby enabling the dental student to concentrate his energies within definite lines of his special education unincumbered by subjects which have no bearing on his specialty of general medicine.

Under these advantageous conditions the dental institutions of the United States have made the D.D.S. degree the evidence of special professional education and skill throughout the world where dental surgery is practised.

To-day the D.D.S. degree has won its peerage of the M.D. degree, and that from the hands of the mother profession, in that the American Medical Association has recently voted the D.D.S. degree to membership.

To-day European and Pan-American institutions are organizing along the lines of those of the United States. Only the other day I received a letter from a member of the Parliament of New Zealand asking for information as to the organization of the New York College of Dentistry, in view of the establishment of a dental department of the University of New Zealand.

With the above work achieved by our dental institutions before them, the dental profession of the United States have reason to be proud of the results accomplished by their professional institutions during the short life history of their profession—as such —of only sixty years. When the history of the nineteenth century is written it will record the fact that in the United States, during the last six decades of the century, the handicraft of dentistry rose to the dignity of a profession, by the establishment of special institutions with a specialized scientific curriculum for its education and training, and under the *ægis* of the D.D.S degree.

Dr. Hopkins.—I certainly am very grateful to the society for

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bringing this subject up for discussion, and while the essayist has come in for a great deal of criticism, I think he may console himself in the thought that he is a martyr to the cause of advanced dental education, and may congratulate himself that he has created a greater interest in the subject than has ever been expressed before at any dental meeting. I am delighted that this dual experiment of a three and a four years' course is going to be tried, and I am not at all sure what the result is going to be. I am not sure but that men equipped as will be the men who enter the Harvard Dental School will be able to accomplish as much or more in their three years than can the ordinary students in four. However, I do not agree with the essayist that any A.B. degree would be a suitable preliminary training. I think that anything which retards the taking up of the technical part of dental work retards the practitioner in the acquirement of manipulative skill. It may have been a faulty observation, but it has been my experience that men who have obtained their academic degree from institutions where they have received no manipulative training, do not acquire skill in practice as early nor as surely as those students who begin their dental work when they are four years younger. It is a question if the academic degree will be altogether helpful until it is changed so that technical requirements may be substituted bearing upon the professional training which is to follow.

Aside from this, I think most of the improvement in preliminary examinations should be upon the subject of English. I believe I can tell, after a student has written an essay of five hundred words, and after I have had fifteen minutes' conversation with him, whether that student is going to be able to understand the lectures in his course and the subjects in his text-books. I think the greatest failing in preliminary education to-day is in English. If a man, no matter whether he comes from the high school or from college, has a correct knowledge of English, it indicates a capacity to understand the theoretical work of his course in dentistry, and is a better preparation than any amount of Latin. There is great encouragement to the profession in the fact that so many representative men are interested in this question of higher dental education, and that each one is seeking for the greatest good of the profession, although perhaps there is lack of agreement as to how it can best be accomplished.

Dr. E. A. Bogue.—It seems to me that the statement has not

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yet been made as to what the dentist's education should be, though I have heard some good English, some bad English, and precious little Latin. A good many years ago there were two or three medical men who took up the study of the mouth and its associated parts.

I do not think that a committee from this body could formulate a practical plan for dental education, nor any other committee. The ordinary dentist's work is to prevent pain or loss, or to replace lost parts. The craft began with the mechanical side. It has been enlarged until the medical branch includes prophylaxis. It has become, in the hands of the colleges and practitioners, a liberal profession. As a mechanical art there was very little to study, but as a liberal profession it has opened up the same field for study and observation as the other professions. The question now comes up as to whether Dr. Eggleston was right when he said that the best way of instructing a man in doing anything that his hands could do was to set him doing it. Dr. Holly Smith tells us that the climate of the country is so varying that we must have varying systems. Dr. Eugene Smith tells us that in certain States technical education is compulsory. We may infer that such States furnish the best preliminary education for dental students. Anyway, we shall undoubtedly find that when the dental instructors of this country shall have perfected their organization, and when they decide what they consider for the best for the students, they will adopt it, and that in the end we will come to a system applicable to the students of the entire country and the teaching will be such as will result in the giving to the profession such a body of men as will administer to the needs of their fellows in the most successful and advantageous manner. I have no doubt that hints from any of us will be thankfully received.

Dr. Ottolengui.—I have been delighted to hear with what perfect frankness this subject has been discussed this evening. The points seem to have all been covered by the gentlemen connected with the colleges. While I am a dentist, I have devoted a number of years to the study of entomology, and consequently the story of the "humbug" was familiar to me. I am going to risk another. A professor once asked one of the boys in his class to tell him what a moth is. The boy told him that a moth is an insect with a head, a body, from one to four eyes, one or two antennæ, and from one to four feet, with a pin through the middle of it. The professor

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said, "Where did you get that idea of an insect?" "From a study of the college collection," was the reply. The essayist's impression of the colleges of the country has been acquired more from similar papers and criticisms than from a study of the colleges themselves. As I have gone about the various cities I have made it my business, wherever there was a college, to visit that college, and I have, without exception, been impressed with the fact that, whether the college was a large college or a small college, the evident intent to do the best that could be done was conspicuously present in all of the schools. I entirely agree with what Dr. Weisse has said. It is well for us to bear in mind that whatever we are, we are the product of our educational institutions, and instead of berating them we should be proud of them and praise them. So far as I myself am concerned, my sympathies are entirely with the schools and what they are doing.

Dr. Kirk brought out the idea that one particular kind of dentist will not suffice for this broad American continent. There is no question but that the system to be adopted by Harvard will be eminently successful and will produce men of the highest attainments, but another class of dentists also is required,—dentists who will be willing to work for the lowly and for lowly fees. We have here in New York a very cosmopolitan centre, and we need men here not only of the highest culture, but also men who will be willing to work among the lower classes and for small stipends. For Thursday night I have accepted an invitation to address a society down in the Bowery, known as the Eastern Dental Society of New York. What litttle I know about these men has interested me. They are practising among an ignorant and cosmopolitan people who understand very little or nothing of the English language. These men are evidently not graduates of Harvard, but are not they doing a good work in this world, and was it not worth while that they were graduated from some school?

So I want to say, with the kindliest spirit in the world to the essayist, that this subject is much larger than his paper has covered or could cover. At the same time, it is in the hands of the very best men capable of solving it, the men who have charge of the colleges. Suppose the schools were all closed. Do you think the men who are criticising them could do better?

Dr. Green.—I feel very much like Daniel in the lions' den, for more than one reason; in the first place, because I do not know

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whether I am alive or not, and in the second place, because I am about as well able to defend myself as Daniel was. There are just one or two points that I wish to go over. The gentlemen who have discussed my paper to-night represent, with one exception, the side of the Associated Faculties, and necessarily their discussion is one-sided. I want to quote once more from Dr. Carlton's paper, not only because it is apropos, but also because, contrasted with the remarks of some of the previous speakers, it indicates that even the Associated Faculties (to whom Dr. Holly Smith so frequently referred) are not entirely agreed in their "ideas" for dental education.

"Higher education is not a question alone of preparing great men for great things; it must also prepare little men for greater things than they would have otherwise found possible. As a good beefsteak disappears in a man and reappears as energy and vigor, so is education absorbed, and reappears as mature judgment, mental balance, keen, acute, grasping intellect. Is there a practitioner among us not holding the degree of Bachelor of Science, Bachelor of Arts, Doctor of Medicine, or otherwise, who does not bitterly regret opportunity slighted or unavailable? He would indeed be glad to possess them, not for the mere degree's sake alone, but for the education's sake. . . . I trust I have said enough to prove to you that the opportunities of modern dentistry are so new and vast that an ampler education is needed by the practitioner of the future. We cannot give them that education in a four years' course at a Dental College. Let him take ten, if necessary, with the preliminary; it will be worth the while, and his place in the professional world will wait for him. The four-year courses in our dental schools will be well and completely filled with good instruction and practical work."

Now, gentlemen, my motives in presenting this paper have been entirely misunderstood. I did not come here to try to teach the men who are in charge of the various dental colleges of this country how to run their institutions; but, on the other hand, I do not agree with Dr. Ottolengui that we must leave the faults where we find them. I am perfectly willing to take all the fair criticism I have received to-night, if I have provoked an honest discussion of this subject. I think Dr. Kirk was disposed to jest with my paper. Some of the indictments he brings against dental education in his various articles are almost as severe, if not more

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so, than mine. In his article in the January, 1904, *Dental Cosmos,* on the "Scientific Method in Dentistry," he deplores the empirical methods in our instruction, etc., and regrets the "attitude of downright contempt" towards scientific methods. This is somewhat at variance with his attitude and remarks this evening. I quote from his article as follows:

"There seems to be a widespread feeling that the scientific method in dentistry is a sort of mental jugglery by which certain men find diversion in mystifying others who have no task for that kind of entertainment. I do not think I have overdrawn the situation, for the belief seems to be quite general that there are two aspects to dentistry,—one denominated 'theory' and the other denominated 'practical.' It is voiced generally by State boards of dental examiners; it is the current belief of dental students. Dental college faculties are by no means blameless in this connection. . . . We must understand always that the school is its corps of teachers, and that everything else in the institution is merely accessory thereto. No man should be permitted to teach, to form the habits of mind, the ideals, of the recruits of our profession who has not in some way obtained that breadth of training which means not only knowledge of the data of science, but scientific culture as well. It is not what he teaches so much as how he teaches that indicates his fitness and determines the type of practitioner he creates. In proportion as the teacher uses the scientific method does he eradicate from the minds of his students the empirical method and improve their mode of practice by putting it upon a rational basis."

Empirical methods, as I understand them, are those which depend upon isolated experiments and observation without due regard to scientific principles. I find our educational methods empirical in that they neglect the first principle of scientific procedure,—a lack of preliminary training.

Most of the criticism here to-night has been directed against my suggestion for a baccalaureate degree as a preliminary requirement. All who have discussed the paper have either ignored or forgotten the fact that I distinctly stated what I considered to be a proper baccalaureate degree, and not "any old degree," as stated by Dr. Holly Smith. I am afraid that Dr. Kirk referred to an amendment of the constitution in a spirit of ridicule. I think it would be possible for an understanding to exist among the or-

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ganized boards of examiners, whereby an interchange of licenses might be effected without a national calamity.

Dr. Holly Smith has mentioned the fact that the climatic conditions in many States makes a nine months' course impracticable. I would like to ask the doctor if in these same States the climatic conditions prevent a man from working more than nine months of the year.

A great many misstatements are charged against this paper. The only reason that I did not mention specific incidents was, that I desired to avoid all personalities. I regret that some of the men who discussed my paper should have accused me of misstatements. To any of these men I shall be very glad indeed to give specific instances in proof of what I have stated.

I am very grateful to you, gentlemen, for having given me so much of your attention.

Adjourned.

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A REGULAR meeting of the Institute was held on Tuesday evening, May 3, 1904, at the "Chelsea," No. 222 West Twenty-third Street, New York, the President, Dr. A. H. Brockway, in the chair.

The minutes of the last meeting were read and approved.

Dr. E. A. Bogue presented the model of a combined bridge and retaining appliance for lower and upper teeth loosened by pyorrhœa. The patient had been requested to call by Dr. Barnes, of Cleveland, one of our fellow-members, the work having been done by Dr. Phillips, of Los Angeles, Cal. It consisted briefly of a lingual and buccal plate accurately fitting the teeth, screwed together, with cement between them and filling all interstices. It took sixteen days to make the upper, and nine days to make the lower, apparatus. The pyorrhœa had stopped as soon as the fixture was in place and there had been no recurrence so far as the patient could perceive.

Dr. F. Milton Smith.—The case presented by Dr. Bogue reminds me of an article written by Dr. William I. Fish, of Newark, nearly five years ago, and published in the INTERNATIONAL DENTAL JOURNAL, upon this subject of bracing loose teeth. That article prompted me to make a brace after this plan for the lower incisors and canines, which proved very useful; I think it would have proved more so had the patient come to me regularly to have the tartar removed. As it was, he came in after three years with the piers very loose.

Dr. H. S. Sutphen.—Five years ago I inserted a similar apparatus for the lower, and have seen that patient every six months since. The whole thing is somewhat loose now, because the cuspids are somewhat loose.

Dr. L. C. LeRoy.—A patient came into my hands for whom Dr. Fish had made a similar appliance to brace all of the upper and lower incisors and cuspids. There was also a condition of cleft palate, and consequently these upper teeth were necessary to hold the plate which was worn for its correction. The appliance strengthened the teeth to such an extent that to-day they are still doing good service after about five years. The lower ones are also doing well. I think Dr. Fish should receive all credit for giving us this excellent method.

Dr. H. W. Gillett.—Dr. Fossume has described a process which

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is often valuable in these cases. The bar is attached to incisors by dowels, the lingual portions of the cutting edges being removed to permit of so applying it that it shall be inconspicuous. This device interferes less with the process of cleaning the teeth than any other I have seen mentioned.

Dr. Freeman Allen, of Boston, read a paper entitled "Recent Methods in the Administration of Anæsthetics." Dr. Allen illustrated his paper with the various apparatus used in the different methods.

RECENT METHODS IN THE ADMINISTRATION OF ANÆSTHETICS.

BY FREEMAN ALLEN, M.D., BOSTON, MASS.

MR. PRESIDENT AND GENTLEMEN OF THE NEW YORK INSTITUTE OF STOMATOLOGY,—It is a great pleasure to speak to you upon this subject, because members of your branch of the profession have always been prominently associated, not only with the discovery of anæsthetics, but with promoting the scientific use of them.

You know that Horace Wells, a dentist living in Hartford, Conn., first used nitrous oxide as an anæsthetic in 1844, and that in 1864 Dr. Colton, a New York dentist, continued the use of gas, which had practically ceased with the death of Wells in 1848.

You know also that Dr. Morton, a Boston dentist, first administered ether in 1846 at the Massachusetts General Hospital, and the names of Carlson, a German dentist, and Billeter, a Swiss dentist, are associated with the first considerable use of ethyl chloride as a general anæsthetic in 1897.

Since the discovery of these various agents very many of the improvements in method and apparatus for administering them have come from members of the dental profession.

During the ten years that followed the discovery of gas by Wells, and of ether by Morton, no progress in method and apparatus was made; but in 1858 Dr. John Snow, of England, did some work on the physiological action of chloroform and ether and devised inhalers for their administration.

Still more important work was that of Mr. J. T. Clover, of London, who in 1862 invented a regulating chloroform inhaler,

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and in 1876 demonstrated the advantage of using gas as a preliminary to ether.

In recent years Dr. Frederick W. Hewitt, of London, has done much to promote the scientific administration of anæsthetics. His most important work, begun in 1886, was the administration of nitrous oxide with definite percentages of oxygen, and in 1894 he perfected an excellent apparatus for this purpose.

So, although Americans discovered gas and ether, yet it appears that since 1858, until very recently, most of the literature of anæsthesia and many of the improvements in methods and apparatus have come from England.

I think the reason for this is the discovery of chloroform by Sir J. Y. Simpson in 1847. Chloroform was found to be a valuable but dangerous anæsthetic, requiring more caution in its administration than gas or ether. The English investigators began by inventing methods and apparatus for the safe administration of chloroform, and, in so doing, their attention was attracted to similar improvements in gas and ether. It became evident to professional men in England that the administration of anæsthetics was too important to be intrusted to inexperienced persons, and men began to devote themselves entirely to this work, with the result that anæsthesia became more systematized than in America.

Since the days of Clover the number of professional anæsthetists in England has greatly increased. To-day in the dental and general hospitals of London anæsthetics are administered almost entirely by professionals. Anæsthesia is systematically taught in the medical schools, and students are required to pass examinations and receive practical training in this line of work before graduation.

Different anæsthetists hold different appointments, just as do surgeons; thus Dr. Frederick W. Hewitt is Anæsthetist to His Majesty, the king; Anæsthetist and Instructor in Anæsthetics at the London Hospital; Anæsthetist at the Charing Cross Hospital and at the London Dental Hospital.

There are societies of anæsthetists who hold regular meetings devoted to the science of anæsthesia; thus Dr. Dudley Buxton is Ex-President of the Society of Anæsthetists; Administrator of Anæsthetics and Lecturer in the University College Hospital; Consulting Anæsthetist to the National Hospital for Paralysis and Epilepsy; Senior Anæsthetist to the Dental Hospital of London.

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Many London anæsthetists are men well advanced in years. Dr. Buxton, for instance, is fifty or fifty-five years old, with gray hair and beard, but well preserved and active; and I remember well at the Middlesex Hospital in London a Mr. Norton, who must have been sixty-five or seventy years old, but a careful and skilful anæsthetist, equal to any emergency.

So, although the most useful and important anæsthetics were discovered in America, they were elaborated in England.

In recent years, however, American investigators have taken up this line of work. In 1889 Dr. Thomas L. Bennett, now of New York, but then of Denver, Col., began to investigate the subject of anæsthesia. He used a Clover inhaler for several years, but finally invented his combined gas and ether inhaler, which is far ahead of anything any country has produced for this purpose. He was, I think, the first professional anæsthetist in this country, and has been practising this line of work in New York since 1897. Dr. Bennett has had many imitators, of whom I am one, and interest in anæsthesia has gradually increased; as yet, however, the anæsthetist's profession in this country is not an overcrowded one.

SECTION II.

The anæsthetics in common use to-day are nitrous oxide, ether, chloroform, mixtures of chloroform and ether, and ethyl chloride. In considering these agents in detail, the most important thing is the question of their safety, which it can do no harm to review.

Of all agents, nitrous oxide, as ordinarily used, is the safest. Considering the innumerable times that it is given, both in this country and in England, exceedingly few deaths are reported. It is considered so safe that most writers make no attempt to estimate its safety in figures. I have seen somewhere its death-rate given as one in two hundred and fifty thousand.

Nitrous oxide and oxygen is a still safer form of anæsthesia, when limited to short operations, but lately anæsthetists, especially in this country, have undertaken to use gas and gas and oxygen for the longer major surgical operations, and have reported administrations of from thirty minutes to two hours and a half.

When thus used the danger of gas, or gas and oxygen, is very materially increased. I have seen very alarming symptoms occur, and, on one occasion, almost lost a patient under this form of anæsthesia. In certain special cases of advanced renal and cardiac

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disease, however, it gives the patient the best chance, especially if the operation is one which does not require muscular relaxation. My longest case was one of forty-five minutes, the operation being dilating and curetting, ventral suspension, and appendectomy. For long operations, however, I have come to regard this form of anæsthesia as treacherous and as less safe than chloroform.

Ether.—Next in safety to gas comes ether. Excepting in people who are distinctly feeble or diseased, ether is perfectly safe. In ether accidents respiration always fails before the circulation, so that, if taken in time and persisted in long enough, artificial respiration will almost always save such cases. The most reliable statistics give the death-rate from ether as one in sixteen thousand.

Chloroform.—Chloroform is the most dangerous of all anæsthetics. Besides being a direct cardiac depressant, it has a tendency to cause irregularities in respiration which react upon the heart. These irregularities are seen mostly in the lighter degrees of chloroform anæsthesia, and may be produced by reflex causes. During the stage of excitement the respiration is especially irregular and the patient may suddenly, with a deep inspiration, inhale an overdose; any interruption of respiration during chloroform anæsthesia is therefore dangerous, as the chloroform already in the lungs becomes incarcerated and reacts upon the heart. Reflex causes, such as operative procedures, are apt to produce temporary arrest of breathing and consequent danger, and, as reflexes are more active during a light anæsthesia, a deep chloroform narcosis is, in some ways, safer than a light one; for this reason, too, chloroform is particularly dangerous in mouth, nose, and throat operations, since respiration is very apt to be interfered with in these cases.

Chloroform is especially unsafe when given to a patient who is sitting upright, because, besides being a cardiac depressant, it is a vasodilator, and allows the blood to gravitate from the great centres in the medulla into the dilated splanchnic vessels. Again, although a deep chloroform narcosis is, as I have said, in some ways preferable to a light one, it has the danger of overcoming the heart by an overdose, so chloroform is dangerous from any point of view. Its death-rate is estimated as one in three thousand.

Mixtures.—I consider mixtures containing ether and chloroform just as much safer than pure chloroform as they contain more ether than chloroform, provided they are administered with certain

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precautions which tend to produce an even evaporation of their ingredients; thus Schleich's Mixture No. 3, containing—

Petroleum ether, 15 volumes;
Chloroform, 13 volumes;
Ether, 80 volumes,

is comparatively safe if given with ordinary precautions, owing to the preponderance of ether in it. When a house officer at the Massachusetts General I gave this mixture for two months as a routine anæsthetic, having two or three accidents, but no deaths.

The English A. C. E. Mixture, containing—

Alcohol, 1 part;
Chloroform, 2 parts;
Ether, 3 parts,

is safer than pure chloroform, though not so safe as Schleich's No. 3.

The best and safest mixture that I know of is the "Anæsthol," recently introduced by Dr. Willy Meyer, of New York. This contains approximately—

Ethyl chloride, 1 part;
Chloroform, 2 parts;
Ether, 3 parts,

and is said to be a true molecular mixture, having a boiling-point of 40° C. (104° F.); this secures the almost simultaneous evaporation of the three drugs, and adds materially to the safety of the mixture. Mixtures are not used enough for valuable statistics to be prepared in regard to them. I think they are safer than pure chloroform, although not so safe as ether.

Ethyl chloride has lately become popular as an anæsthetic. The most reliable statistics place its death-rate as one in sixteen thousand, but as it has not been used nearly as long as other anæsthetics, statistics in regard to it have not much weight. It is analogous in its action to gas, and my limited experience with it leads me to believe that it is safe if restricted to short operations. It does not produce cyanosis, but seems at times to have a slight depressing effect upon the circulation, especially during the first part of the administration. If we accept its death-rate as one in

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sixteen thousand, we find it safer than chloroform, as safe as ether, but not so safe as gas.

This gives the following order of safety of the anæsthetics we have been reviewing:

1. Nitrous oxide and oxygen (if limited to short operations).
2. Nitrous oxide.
3. Ether.
4. Ethyl Chloride.
5. Mixtures.
6. Chloroform.
7. Nitrous oxide and oxygen, when used in long operations.

Deaths occurring under anæsthetics should always be reported promptly and in full detail, as this is the surest way of determining the safety of any anæsthetic.

But simply because one agent is statistically safer than another, it should not be arbitrarily used in preference to that other, nor should any one method, such as giving morphine and atropine, be recommended as a routine procedure. As in other branches of medicine, different patients require different agents and methods, and the anæsthetist, having carefully examined his patient, must select and vary his treatment according to age, sex, disposition, habits, condition of the heart, lungs, etc.

To meet the indications of various cases anæsthetics are administered in sequence, as it is called; for example, we use the gas-ether sequence, the ethyl-chloride-ether sequence, the anæsthol-ether sequence, and the gas-ether-chloroform sequence.

Besides the proper selection of the anæsthetic the anæsthetist must concern himself with many details, such as the influence of posture upon the respiration and circulation, the proper protection of the patient during operation against drafts, pressure paralyses, etc., and must attend to the proper stimulation of the patient in case of necessity. He should be held entirely responsible for the safety of the patient as regards the anæsthetic. Ether pneumonia and other sequelæ may also be said to be due to lack of care on the part of the anæsthetist.

SECTION III.

I will now speak of some practical points in the administration of these agents.

Gas.—Gas is so easily eliminated that in order to be effective

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it must be made to replace the residual air in the lungs, and the access of fresh air must be cut off for the time being. In other words, to produce the best results pure gas and no air must be given, at least for the first part of the administration. The practical difficulty that we encounter in giving gas is not from giving the patient too much gas but from giving too much air, thus delaying anæsthesia. Therefore, in order to be effective, the gas machine must be so made as, first, to keep out air; secondly, to replace residual air in the lungs with gas; and thirdly, to keep a certain amount of gas constantly in the lungs.

The simplest and most effective form of apparatus for this purpose is the one ordinarily seen in the dentist's office where much extracting is done. Gas is liberated from a cylinder and enters a long tube of large caliber which ends in a mouth-piece. This is placed in the patient's mouth and the lips are closed over it. If the nose is also closed the patient inspires pure gas; if the nose is not closed he inspires gas plus a small amount of air; during expiration air plus a certain amount of gas passes through the nose; thus with each inspiration the patient gets more gas; with each expiration he loses more air, so that gas gradually replaces air in the lungs and anæsthesia rapidly results. When the inhalation is stopped there results an anæsthesia of varying duration, which is called the "available" or working anæsthesia. This apparatus is simple and effective, but is not portable, and is suited only for dentistry.

The same result is accomplished in other forms of apparatus which have closely fitting face-pieces to exclude air and inspiratory and expiratory valves; the best form of such an apparatus is Bennett's gas inhaler. Gas is liberated from a cylinder and conducted by a rubber tube to a distensible rubber bag of about two gallons capacity; the closely fitting face-piece is accurately applied, gas is liberated from the bag, and is inspired by the patient through the inspiratory valve; the patient expires through the expiratory valve, the expirations going into the surrounding air and no fresh air entering the lungs during inspiration, the expiratory valve being closed. In this way gas is made with each inspiration gradually to replace the residual air in the lungs. When signs of approaching anæsthesia occur, the gas may be shut off and the valves thrown out of action by turning the stop-cock; the patient breathes back and forth into the bag. The result of this, however, is not asphyxiation,

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but delaying of asphyxiation, because the patient is breathing a mixture of gas plus what residual air there is left in the lungs, whereas, if he had been permitted to go on breathing gas through valves the gas would have replaced all the air in the lungs and asphyxia would result, so this manœuvre of throwing the valves out of action delays asphyxia and also results in a longer available anæsthesia, because, as a rule, the longer the inhalation the longer the available anæsthesia.

For dentistry, perhaps, this form of apparatus presents little advantage over the simpler form that I at first described. For the longer surgical operations it presents distinct advantages: in the first place, the bag, being near the face-piece, offers no mechanical impediment to respiration; in fact, by keeping the bag well filled, a constant positive pressure is kept up which keeps a steady stream of gas flowing into the lungs without much inspiratory effort on the patient's part. The vents for the admission of air enable us to keep the patient under, and, at the same time, to admit such small definite quantities of air as are necessary to prevent too much cyanosis. In using this machine the most essential point is to select an accurately fitting face-cushion, as even very small amounts of air admitted during the first part of the inhalation will spoil a good gas administration.

It is possible to give gas with suitable proportions of air for long operations, but it usually produces an unsatisfactory form of anæsthesia, owing to the lack of muscular relaxation and the asphyxial symptoms that occur with it. Without discussing the physiological reason for this, the clinical fact is, that it is not possible to give enough air with gas to dispel these asphyxial symptoms and, at the same time, to control the patient. My longest case of gas and air anæsthesia was a nephrectomy lasting thirty-five minutes.

Other methods of giving gas in which you may be interested are (1) Dr. Flux's open method; (2) Dr. Patterson's apparatus for giving gas in long operations on the mouth.

In Flux's method an open cone made of glass or celluloid, with an accurately fitting inflatable rubber-cushion, is used. Gas is allowed to flow into the top of this cone during inspiration only, and, being heavy, sinks at once to the bottom of the cone and is inhaled. In timid persons and children this method is said to produce a tranquil and satisfactory anæsthesia without cyanosis;

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it consumes a great deal of gas, however, and does not seem to me practical.

Patterson's apparatus I have seen used at the London Dental Hospital. It consists of a gas-cylinder with a foot-key by which gas is liberated through a long rubber tube into a rubber bag of four gallons capacity; at the top of the bag is a stop-cock which turns on gas or air as needed. From the stop-cock two tubes lead to the nose-piece fitted with an inflatable rubber cushion to permit of closer approximation. This is closely applied over the nose and the patient breathes gas. Anæsthesia takes a little longer by this method, owing to the air inhaled through the mouth; if more rapid anæsthesia is desired, there is a separate mouth-piece fitted with an expiratory valve, by which the patient gets no air and the anæsthesia results more rapidly. With the nose-piece only, in about fifteen or twenty seconds; eight or ten gallons are used for an ordinary administration and twenty or thirty gallons last ten or fifteen minutes.

An important advance was made in 1894 when Hewitt perfected his apparatus for the administration of gas with definite percentages of oxygen. You know that nitrous oxide is a pure anæsthetic and is not dependent upon asphyxia for producing its results; this is proved by the fact that by admitting definite percentages of pure oxygen it is possible to keep patients deeply and quietly anæsthetized for long periods of time without any asphyxial symptoms. A suitable patient under this form of anæsthesia appears to be sleeping peacefully, with normal or slightly improved color and tranquil or gently snoring breathing; it gives a longer available anæsthesia in dentistry than does pure gas. (Describes apparatus.)

Ether is commonly administered in one of two methods.—the semi-open method and the closed method. The semi-open method is the one ordinarily seen in hospitals, and consists in giving ether on a cone made of tin or paste-board. The paste-board cones are the best, as they can be accurately fitted to the face. This method is the best for persons who are not experts, but it requires large amounts of ether unless the cone is accurately moulded to the face so as to exclude air.

The principle of air limitation in giving ether was expounded by Clover in 1876 when he invented his inhaler. This is known as the closed method, and in experienced hands is much better than

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the open method, because it requires very much less ether, and the proportions of air and ether-vapor are under perfect control. The result is that patients are less apt to become "soaked" with ether, and recoveries are much more rapid and free from nausea and vomiting. Bennett's ether inhaler is the best type of the closed inhaler; with it suitable patients can be comfortably and safely anæsthetized with ether in from two to five minutes, and the entire apparatus can be boiled and sterilized without damaging it.

A third, and exceedingly useful, method of giving ether is by the apparatus invented by Dr. Fillebrown, of Boston, or the Harvard Dental School. In dental and oral surgery it is necessary to give ether with the mouth open in order that the surgeon may work while the anæsthesia is being continued. Ether, as ordinarily used, could not control the patient in the presence of so much air; nor is chloroform safe for such cases owing to the danger connected with giving this direct to patients in the sitting posture. Dr. Fillebrown's apparatus heats the ether, thus doubling the rate of its evaporation and intensifying its strength so as to make it effective with large amounts of air. His original apparatus was modified by his assistant, Dr. Rogers, and still further improved by Mr. Lockwood, of Boston. It is exceedingly practical in head cases of all kinds, and will control very difficult subjects. (Demonstration of apparatus.)

Gas and ether, or the gas-ether sequence, is much used in surgery. When properly administered it is a great comfort to both patient and surgeon. Instead of ten or fifteen minutes of struggling, shrieking, coughing, retching, and vomiting the patient may be safely plunged in a profound anæsthesia in two minutes. English statistics estimate the safety of gas and ether as greater than that of ether alone. When gas is used there is much less nausea and vomiting and a more rapid recovery; the patient is spared all the suffocating sensations so often produced by ether alone. This method is useful in dentistry because it is safe in the sitting posture and will give an available anæsthesia which may be anywhere from four to ten times as long as that resulting from gas alone, and a recovery which is often unattended by nausea and vomiting. (Demonstration of Bennett's combined gas and ether inhaler.)

The principles of giving chloroform are exactly the opposite of those for ether. It must, under all circumstances, be adminis-

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tered with large amounts of air, as it is easy to give an overdose. Chloroform is best given on an Esmarch or Schimmelbusch mask, using a drop bottle and the constant drop method. It can also be satisfactorily given on a small, square piece of folded gauze, by the so-called "Scotch" method, which consists in shaking on comparatively large doses of chloroform at intervals. For dental and oral surgery, tracheal chloroforming, etc., many regulating chloroform inhalers have been devised. A good one is Krohner's regulating inhaler. (Demonstration of Krohner's regulating inhaler.)

Mixtures, according to the amount of chloroform they contain, should be given with more or less air; thus the English A. C. E. mixture, having two parts of chloroform and three of ether should be given as chloroform, while Schleich's mixture No. 3 can be given on a cone or other form of semiopen inhaler. As I mentioned before, the danger in mixtures is the different rates of evaporation of their ingredients, but if the mixture has a definite boiling-point and is administered by the drop method, this danger is practically nil.

I have had considerable experience with mixtures, and consider them safer than chloroform.

Much has been written lately about ethyl chloride, which until 1897 was used only as a local anæsthetic. Ethyl chloride is exceedingly volatile, has a low boiling-point,—that is, 12.5° C. (55° F.), —a slight, rather oniony odor, and is inflammable. It is sold in graduated glass vials with patent stoppers under various proprietary names. The commonest kinds are "Antidolorin," "Anæstile," "The Cleveland Gas Company's Agent," "Kelene," and "Narcotile." Of these, I have found that kelene and narcotile give the best results, and I have used narcotile more than any other.

Ethyl chloride is analogous in its action to gas, producing its effects more rapidly and being very rapidly eliminated. It must be given on the same principles as gas,—namely, with almost complete exclusion of air. Ethyl chloride is useful, and I believe safe, in slight operations that do not require muscular relaxation nor a deep anæsthesia. I believe it has been found by American practitioners to be unsatisfactory in dental surgery, on account of the short available anæsthesia that it produces. Dr. Thomas D. Luke, of Edinburgh, however, reports a series of dental cases in which the available anæsthesia varied from one to five minutes, which is longer than that produced by gas. It does not produce cyanosis,

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but it will not abolish the higher reflexes nor produce muscular relaxation. My longest case with it was one of forty minutes, given for an orthopædic operation on the ankle-joint. This anæsthesia was very ragged, and was followed by intense and persistent nausea and vomiting. My experience with this drug is limited to about sixty cases, which, I regret to say, I did not record systematically, but many of them were followed by nausea and vomiting.

Since many writers, carried away by enthusiasm for ethyl chloride, have claimed that it is superior to gas and will supplant gas, it may be profitable to compare the two. Ethyl chloride, although it seems to be safe, is not so safe as gas, and has not been put to anything like the test for safety that gas has, only having been used since 1897. Ethyl chloride is not so agreeable to inhale as gas; gas has more of a taste than an odor, and patients who have taken both have assured me that they preferred gas. Recoveries from ethyl chloride are much less satisfactory and much more often attended with headache, nausea, vomiting, and a dazed condition of the mind than are recoveries from gas, in which the patient is usually free from nausea and vomiting and perfectly normal at once. So, although ethyl chloride produces no cyanosis, is perhaps less expensive, is more portable, and requires less skill to administer than gas, yet these trifling advantages should have no weight in the face of the three facts I have just mentioned. It may be used to precede ether, but in this respect, also, is inferior to gas. (Demonstration of Ware's and Ash & Sons' inhalers.)

DISCUSSION.

Dr. Emil A. Rundquist.—The safety of anæsthesia depends upon a great many things, not the least important of which is the skill and resource of the anæsthetist. The first factor to be considered is the choice of the anæsthetic with regard to the individual and the nature of the operation. The rapidity of the operation, whether long or short, is also a factor upon which the safety of the anæsthetic depends. The preparation of the patient before the operation and the position of the patient during operation are also to be considered, a sitting position always being avoided except when administering nitrous oxide.

The choice of the anæsthetic is influenced by the climate. Chloroform seems to be safer in hot climates, probably because it

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is more easily eliminated, most deaths from chloroform occurring in the cold season of the year.

Age also influences the choice. Generally speaking, children take ether more satisfactorily, while in old people chloroform is preferable. The normal adult should be given ether instead of chloroform. The pathological adult should be handled with more caution. If the blood-pressure is low, ether is indicated. In diseases of the arteries it should be borne in mind that chloroform diminishes the strain on the blood-vessels. Hence in an old person with brittle vessels chloroform is often the safer. In cases of fatty heart and myocarditis ether is indicated, but it should be administered with care. With regard to the *lungs,* chloroform is indicated in cases of chronic bronchitis or chronic tubercular lesions. In pneumonia, with poisoned heart, or empyema, ether should be given the preference. For the removal of foreign bodies in the larynx or trachea, or for the removal of tumors in these localities, chloroform is the better. Anæsthetics should be given with great care in cases of profound anæmia and blood-changes of that type. In general diseases, diabetic patients require ether. In alcoholism chloroform is better, chiefly because a person addicted to the excessive use of alcohol will require an enormous amount of ether to produce anæsthesia. In regard to the kidneys, in chronic nephritis, tension is the key note. When there is increased arterial tension, chloroform had better be given, otherwise ether is the safer, as it produces less marked degeneration. However, there is great difference of opinion on this subject. In sepsis, shock, and hemorrhage, the minimum amount of anæsthetic should be used. Ether is probably best, but must be given with care. In fat people with short necks, who generally have mechanical inspiratory difficulty, chloroform is the anæsthetic of choice.

The kind of operation influences the choice of the anæsthetic to be given. For abdominal operations Kelly prefers chloroform, but in New York the majority of men use ether. It is probable that ether is safer and gives just about as good results. In operations about the face of considerable duration, besides the methods spoken of by Dr. Allen, there is the method of administering the anæsthetic by means of a tracheotomy tube; the method of rectal anæsthesia is mentioned only to be condemned. For peripheral operations that do not require marked relaxation, in well-selected cases, laughing-gas and oxygen will do. Ethyl chloride is also used,

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but is not so safe, as it lowers arterial tension. In obstetrics, chloroform is generally used to ease the labor-pains, but in cases of version or Cæsarean section, ether is better. Chloroform should be avoided in cases where repeated narcoses are necessary, as chloroform is not eliminated as readily as ether, and may cause fatty changes in the viscera.

The dangers of an anæsthetic are remote and immediate. With ether there is danger of sudden respiratory paralysis causing death (rare). The remoter dangers have not been quite so clearly laid before the medical profession, but they are being met with all the time. Remote pulmonary dangers are more marked with ether than chloroform. Renal dangers may occur all the way from acute congestion with little albumin, up to suppression of urine. This occurs less with chloroform than with ether. Fatty visceral degeneration does not occur with ether. Both ether and chloroform have post-operative sequellæ, ether not causing the degeneration that is caused by chloroform. In a typical case of late chloroform death, the patient was negative to examination, but required a great deal of chloroform to produce relaxation. Convalescence went well till the second day after the operation, then jaundice appeared, with albumin and casts in the urine. There was no temperature. The patient died in coma on the fifth day. Autopsy showed fatty degeneration of all the viscera.

Of deaths from chloroform and ether, the best statistics show: ether, immediate, one in twenty-nine thousand cases; chloroform, immediate, one in three thousand cases. Remoter pulmonary deaths from ether, according to statistics from St. Thomas Hospital, London, show one in two thousand four hundred.

The causes of post-operative lung complications are: (1) Direct bronchial irritation with hypersecretion of mucous, washing down the bacteria into the terminal alveoli, setting up a pneumonia. This is worse with ether. Cyanosis distinctly increases the secretion of mucus in the bronchi. (2) Toxic action on the pulmonary blood-vessels. This is a little worse with ether than with chloroform. There is dilatation and exudation of serum. The resistance to infection by direct inspiration, emboli, and through the blood is lowered. (3) The inspiration of vomitus, blood, or infected secretions from the mouth, nose, etc. (4) Infected thrombi from operative wound. In cocaine anæsthesia in German clinics this explained the very frequently resulting pneumonia. The small thrombi were

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washed over into the mesenteric vessels, thence passing into the pulmonary circulation. (5) Chill, fright, or shock of operation all lower the resistance. (6) Prolonged anæsthesia even with small amounts of anæsthetic. (7) Restricted respiration from pain or tight dressings. (8) Maintenance of one position, especially in old people, may cause hypostatic pneumonia. (9) Operation or infection near pleura. The results of these post-operative lung complications may be enumerated as follows: Pulmonary œdema, acute bronchitis, lobar and broncho-pneumonia, pleurisy, hemorrhagic infarctions, gangrene, abscess and exacerbations of chronic processes, emphysema, and tuberculosis.

Several precautions are used to prevent pulmonary complications: (1) Morphine and atropine are given before an operation with ether. (2) Digitalis and strophanthus before chloroform. These are more for the effect upon the heart. (3) The stomach is washed out, and care is taken that there is not a regurgitation of the contents of the stomach, the patient virtually drowning in the vomited material. (4) Rose's position is used. (5) Interrupted ether narcosis. Sometimes possible in breast cases where complete relaxation and deep narcosis is not necessary; giving one-sixth to one-fourth grain of morphine one hour before operation and combining with local anæsthesia if necessary. (6) Becker in Hildesheimer's clinic adds twenty drops of oil of pini pumilionis to ether before beginning. In five hundred cases it stopped secretion of mucus. It has been used in cases of pulmonary disease. (7) Asepsis both of the wound and of the apparatus used. (8) The minimum amount of anæsthetic should be used. (9) The rapidity of the operation diminishes the likelihood of lung trouble. (10) Avoid undue exposure, fright, etc. (11) The patient's position in bed should be changed as frequently as possible, especially in aged patients.

Regarding the amount of anæsthetic used, out of one hundred personal cases using nitrous oxide and ether the average time of the operation was seventy-five minutes, requiring an average of 4.7 ounces of ether. This would average three and three-fourths ounces of ether per hour. Out of this number of cases the best required five ounces of ether for an anæsthesia of two hours and forty minutes. Regarding the time required for complete anæsthetization with ether used in the ordinary method, thirteen minutes is about the average, while with nitrous oxide and ether complete relaxation

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can be produced in an average of three minutes, and in some favorable cases in one and one-half minutes.

There is no apparatus that will make chloroform safe. Chloroform is distinctly a dangerous drug, and for the unskilled man ether is much better. I wish to deprecate the habit etherizers have of rubbing the conjunctiva to ascertain the degree of anæsthesia. It is distinctly a bad custom, because of the resulting infection and subsequent conjunctivitis. Care should be taken during operations to avoid pressures which will result often in paralysis of the musculo-spiral, brachial, or popliteal nerves. In pelvic work the anæsthesia can be pushed to stop abdominal breathing. Anæsthesia deepens somewhat in the Trendelenburg posture.

The essayist spoke of anæsthol as a very satisfactory anæsthetic. It is claimed to be a new solution, and not merely a mixture. It consists of ethyl chloride, seventeen per cent.; chloroform, thirty-six per cent.; and ether, forty per cent. It boils at 104° F. It is given on a mask by the drop method. Of course, the ideal anæsthetic would be one a certain number of minims of which, injected by a hypodermic syringe, would give a certain definite result. Some work has been done along this line. Scopolamine and morphine have been used. The two act in opposition except in the brain, where they unite to narcotize. Scopolamine is not toxic like atropine. It dilates the pupils, stimulates the pulse and respiration, stimulates peristalsis, and raises the blood-pressure. Morphine is the more dangerous drug of the two. One death has been reported in one hundred and sixty-two cases. A test dose is given the evening before of scopolamine, $^1/_{130}$ grain; morphine, ½ grain. In the morning scopolamine, $^1/_{65}$ grain, and morphine, one grain. After waiting one and one-half hours, give the evening dose again. This is the maximum dosage. If the pupils are not dilated, give more scopolamine. Blos reports one hundred and five cases, one death, seventy ideal, twenty-nine required little ether, and six could not be narcotized. The danger lies in the respiratory paralysis. The muscular relaxation is not perfect.

Dr. Bryan D. Sheedy.—I feel very grateful to the reader of the valuable paper presented this evening for your consideration. I also thank Dr. Wheeler, your secretary, for affording me the pleasure of hearing the paper, and your chairman for allowing me to take part in the discussion. The subject matter attracted me, though I feel very much like an outsider in taking part in this

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meeting, made up, as it is, almost wholly of gentlemen of another profession, and in a discussion of subjects that the medical practitioner seldom considers. As my work is limited to diseases of the mouth, ear, nose, and throat, almost daily do I come in contact with the work of the dentist. It is impossible to divorce your work from that of the rhinologists. I hoped for something in the paper and discussion that would throw light on the subject of anæsthesia of the parts which you are so often called upon to operate. The paper has certainly been a valuable and practical one along the line of general anæsthesia, and I fear the remarks I expect to make will be a little off from the point, as I intend to discuss very briefly anæsthesia as applied to the locality of our daily occupation.

One word in regard to ether and chloroform anæsthesia. In the New York Post-Graduate Medical School and Hospital, where there are probably as many surgical operations as in any other institution in New York, gas and ether anæsthesia is the rule. In London ether is seldom used. It will be a difficult matter for us to explain why most English and continental surgeons consider chloroform a safer remedy than ether, while in America ether is used almost to the complete exclusion of chloroform.

Personally I have had some very disagreeable experiences with both ether and chloroform in operations in and about the mouth, nose, and throat, and I firmly believe that if statistics were published of the operations in and about these parts under profound ether or chloroform anæsthesia, the percentage of death would be very much higher than that ordinarily given in standard textbooks. I know of more than one death that has occurred in New York City during the past few years in connection with operations about the upper respiratory tract that have not been figured in estimating the percentage of deaths from anæsthetics. My personal experience in one case not very long ago will remain with me for some time. I have been teaching the students of my clinic in the New York Post-Graduate Medical School and Hospital that for short operations in and about the upper respiratory tract profound and complete anæsthesia by ether or chloroform is not advisable. I know of the arguments advanced in regard to the dangers of primary chloroform anæsthesia, but these arguments do not hold in regard to primary ether anæsthesia, as I believe the danger from complete anæsthesia in operations about the nose, throat, and mouth, and of infected secretions passing into the trachea and lungs of

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the patient, are not sufficiently emphasized. I recommend that just enough anæsthetic be used to prevent fright and pain, but not enough to destroy the laryngeal reflex, thereby allowing blood or infected material to gain entrance into the larynx.

I believe, if we bear this point in mind, we will not have the dangerous symptoms manifested in profound anæsthesia where bloody operations are performed in the mouth and upper respiratory tract. We will also save our patients many cases of pneumonia and other infectious diseases of the lungs following the use of general anæsthetics.

Regarding the question of chloroform and ether, I believe the average American surgeon knows very little about chloroform anæsthesia, as it is so seldom used in this country. In New York and other American cities a death from chloroform is looked upon almost as malpractice, while abroad you are immediately picked out as an American if you mention ether. The remote results of ether are far worse than we generally consider, while the immediate effect of chloroform is much better in the hands of experienced surgeons than Americans generally allow.

When we become more familiar with chloroform as it is used in Great Britain, I firmly believe we will use less ether and more chloroform.

With apologies to the essayist, allow me to discuss local anæsthesia for operations about the nose and throat as it is carried on in the clinics of the New York Post-Graduate School and Hospital at the present time. Operations have been done without pain under cocaine anæsthesia during the past four months, in which general anæsthesia was always considered necessary. It is a daily occurrence in that institution for the antrum to be opened, the ethmoid cells curetted, the turbinates excised, septal spurs removed, and cutting operations of other sinuses done under a five or seven per cent. cocaine solution. For the complete antral operation we cocoanize as follows:

We apply the cocaine on a pledget of cotton saturated with an eight or ten per cent. solution, allowing this cotton to remain next the part to be operated upon for from fifteen to twenty minutes while we inject into the antrum a small quantity of a two or three per cent. solution. I believe all the operations that we are called upon to perform about the nose and throat can be done with a five or six per cent. solution, and we will avoid many of the disagreeable toxic effects by confining ourselves to the weaker solutions.

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The application of adrenalin to the parts at the same time the cocaine is applied reduces the danger of cocaine poisoning. I apply the adrenalin and cocaine to the tissues on the same pledget of cotton, so that the combined effect is obtained. The probable action of adrenalin is the contraction of the smaller lymph- and blood-vessels, thus preventing the too rapid absorption of the cocaine.

Adrenalin is also one of the best heart tonics we have, so that it is barely possible that some of the symptoms associated with cocaine anæsthesia may be avoided by using adrenalin. There is only one feature connected with adrenalin that has proved disagreeable in my hands. There seems to be a great tendency to secondary hemorrhage, which occurs four or five hours after the operation, so that to-day I do not use it as often as when it first came on the market.

I thank you, gentlemen, for allowing me the privilege of this discussion, and the only excuse I make for introducing the subject of local anæsthesia is its common applicability to your every-day work.

Dr. L. C. Leroy.—How much adrenalin do you use?

Dr. Sheedy.—I generally apply equal parts of the one to one thousand adrenalin solution and a seven per cent. solution of cocaine to the parts on a pledget of cotton.

With regard to adrenalin, let me say that it is a drug which deteriorates very rapidly, and should be used within a short time after the bottle is opened, else it becomes acid and very irritating.

Dr. J. Morgan Howe.—I have nothing to say except to express my appreciation for the valuable service rendered us this evening by these gentlemen who have been so kind as to come here and tell us what we have heard, and to express my sincere thanks to them for their kindness. I would at this time move a vote of thanks to the gentlemen who have been so kind as to enlighten us upon the subject of anæsthetics.

Dr. S. E. Davenport.—It seems to me that considerable advance has been made in the last few years in the manner of producing general anæsthesia. My mind goes back some ten years to the occasion when a lad, especially dear to me, was anæsthetized, and so unpleasant was the experience that the boy ascribed all his subsequent illness during the slow recovery from the condition which had made an operation necessary to the bitter medicine, as he characterized it, that the doctor had forced upon him. I was informed

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by a lady patient the other day, that her son had recently been operated upon for suppurating mastoid processes, and that she could not say enough in commendation of the method used by the gentleman who administered the anæsthetic. The anæsthetist, evidently fond of children, made himself very agreeable, and gained the boy's confidence in a few moments. He opened his bag and invited the lad to help him take out the things. An apparatus similar to one exhibited to-night was produced, and the boy was asked if he would be willing to help "blow up this bag," and he finally went off to sleep in the midst of the game. While I am told that it is not good form to commend an essayist for what he has done for a society, I really thing that Dr. Allen, by leaving his busy life and taking the pains to bring to us such a complete exhibit of all the paraphernalia of his profession, should receive from us the very highest thanks.

Dr. Allen.—I should like to express my appreciation for the kind invitation and for the cordial reception and the courtesies I have been shown.

Dr. Bogue.—I would like to ask Dr. Sheedy how he is able to get deep local anæsthesia in the manner described, as the anæsthesia from cocaine travels from the centre towards the periphery.

Dr. Sheedy.—I would not attempt to give a physiological answer to the doctor's question. I only know that we do get results.

Dr. Bogue.—I had occasion recently to open down on to the buccal root of a molar, using the chloride of ethyl. I asked my patient if she felt it, and she did not reply. I made my operation and still she did not reply.

Dr. Allen.—I believe the properties of ethyl chloride were discovered while it was being used as a local anæsthetic.

Dr. Bogue.—I have seen it used in Paris very extensively for adenoid operations.

Dr. Allen.—About the dangers following etherization being underestimated, this is the point I have been trying to bring out. Both ether and chloroform have their post-operative sequellæ.

Adjourned.

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A MEETING of the Institute was held at the Chelsea, No. 222 West Twenty-third Street, New York, on Friday evening, June 3, 1904, the President, Dr. A. H. Brockway, in the chair.

The minutes of the last meeting were read and approved.

COMMUNICATIONS ON THEORY AND PRACTICE.

Dr. C. O. Kimball presented a set of Dr. D. D. Smith's scalers upon which he had made some slight alterations that in his hands he had found to improve their utility. He had found them excellent for cleansing teeth.

Dr. J. Morgan Howe.—I have for some time wanted to express my appreciation and thanks to our fellow-member, Dr. Strang, for introducing the method of mixing amalgam and cement which he has recommended. I have found such mixture of the two materials to be so valuable that I think those who have not tried it would do well to do so. The use of a rather slow-setting amalgam and a quick-setting cement works best, in my estimation. The filling being mixed and introduced, in five or six minutes the filling can be shaped and margins made flush; then lightly rubbing the surface with a burnisher will cause the particles of amalgam to coalesce, giving practically an amalgam surface. This method will prevent the filling from wearing rough, at least in a great degree.

Dr. S. E. Davenport.—Will Dr. Howe kindly tell us for what class of cases he thinks this combination is best adapted?

Dr. Howe.—The filling is adapted for those cases where adhesion to the walls of the cavity is desirable, the cement giving the filling the adhesive qualities, while the amalgam protects the cement and gives durability. Cavities that run under the margin of the gum, filled with it, have made a good record in mouths where cement alone would quickly waste away and gutta-percha had proved to be practically worthless.

All conditions unfavorable to the retention of the filling because of the shape of the cavity or the weakness of the walls are indications for this mixture of amalgam and cement.

Dr. F. Milton Smith.—I would be willing to part with almost anything else in the way of a filling-material rather than with this combination. I believe that almost any one will make a failure in

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the use of this filling-material if he does not use the utmost care, following the little details of preparation according to Dr. Strang's directions. I had in my office to-day a patient for whom I inserted one of my first fillings of this kind, a posterior cavity in an upper first molar. It was something over five years ago, and the tooth is practically perfectly preserved. I am sure that in that time it would have been filled four or five times with either cement or amalgam. I have had almost uniform success, although I have had cases where the combination has worn away quite rapidly. This, however, I have ascribed to some fault of my own in the mixing.

The President.—I have used this combination in many cases with great satisfaction. Dr. Strang does not claim that he originated this method, but gives the credit, I believe, to Dr. Tillotson. Our Dr. C. B. Parker, I remember, read a paper describing it several years ago.

Dr. Smith.—Regarding the proper proportions for this mixture, the amount of cement powder is one-half as much as the amount of filings in bulk. The filings are amalgamated first and placed in a mortar with the oxide of zinc and the two ground to almost an impalpable powder. It is then placed on the slab and mixed with the liquid of the cement, the mass then being kneaded with the fingers for a little while. A matrix should always be used for approximal cavities, and the filling inserted with pressure. Then a thorough burnishing over the surface makes a filling that will last.

Dr. C. O. Kimball.—Might I modify Dr. Smith's excellent method? I too am very much indebted to Dr. Strang, and have used this method continually. I do not altogether like the "rule-of-thumb" method followed by Dr. Smith. I have the powders taken out separately and placed in two heaps. I prefer a rather slow-setting cement, and find the Dirigo very satisfactory for this purpose. The amalgam is mixed dry, rubbing it up in a mortar, not touching it with the hands at all. The powder is then placed in the mortar and thoroughly incorporated with the amalgam. It is then placed on the slab and mixed with the phosphoric acid, then not rubbed in the hand but with the spatula until the right stiffness is obtained, which can be judged by the feeling of the spatula. It is not rolled in the hand, but taken up by the spatula and put directly into the cavity, where it is thoroughly and rapidly moulded into the required contour. I think it is well, as far as possible, to avoid all contact with the hand, and above all the tooth must be

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kept perfectly and absolutely dry from the beginning to the end of the operation. A little fresh amalgam may be burnished over the surface after the proper shape has been given to the filling. If carefully done it will make a filling that will stand in a wonderful way.

Dr. Fossume.—I wish to present for your inspection a set of instruments made of ivory for burnishing inlay matrices. These instruments will not iron or stretch the matrix, and thereby overcome, to a great extent, the rigidity and pulling away of the metal.

I also pass around some aseptic dental-bracket covers that Johnson & Johnson are putting on the market. They are made in three sizes, for the Allen, Holms, and Harvard tables, and are put up in boxes containing from one hundred to five hundred covers. The idea is to get an aseptic cover at a small cost, so that they can be changed after each patient. These covers will be supplied, I believe, at seventy-five cents a hundred.

Dr. J. Morgan Howe.—Mr. President and gentlemen, the subject of malignant growths in the mouth has interested me for a number of years, not because I know anything about it, but because a good many cases have come under my observation. I have been willing to speak upon the subject this evening in order to urge upon dentists the desirability of their giving attention to the subject, that they may early recognize any suspicious indications. I have seen several cases where the patient was passed from dentist to physician and back to the dentist again, the physician supposing the trouble to originate from the root of a tooth and the dentist not being certain whether it was a tooth or not, the patient being encouraged to await developments, action being postponed until—in one case—fatal results followed. I got the patient into the hands of a surgeon,—the late Dr. Garretson,—and he was operated upon the very same day that I saw him first, but the tumor recurred. I would not urge upon dentists the study of malignant growths with any other object than to have their suspicions aroused when they should be. I have in mind a patient who, when I suggested that a section for examination be made of a tumor, stated that this had already been done and the tumor pronounced benign, the patient giving the name of a dentist whom I knew to have given some attention to microscopy and histology. My examination of the case was some months later. I would not advise dentists to set themselves up as pathologists, but to make such a

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study of malignant growths as to be able to give patients good advice. It not infrequently happens that patients are needlessly alarmed about some little thing that need not be suspected of malignancy, and the dentist is fortunate who can dissipate such fears.

We are very fortunate in having with us to-night a gentleman who can tell you a great deal about this subject. I will say, in this connection, that I have been very much interested in reading Dr. Dawbarn's book, for which he received the Gross prize. The book contains a description of diseased growths in a good many parts of the body and not a few about the mouth. It is one of the books that is well worth the attention of dentists.

Of course it is understood that in speaking of this subject I merely call attention to it from a dentist's point of view. We expect the information from the gentlemen who are to follow.

MALIGNANT GROWTHS IN THE MOUTH.

BY R. H. M. DAWBARN, M.D., NEW YORK.

GENTLEMEN,—The chief forms of malignancy directly of interest to stomatologists are, the bony tumors of the jaws, malignant epulis, cancer or sarcoma of the tonsils or pharynx, cancer of the tongue and of the lip.

In order to compress my paper within modest limits I shall only refer to such points in diagnosis as have a very practical bearing for you. As to tumors of the jaws, the case narrated by Dr. Howe demonstrates the ease with which a growth filling the antrum can be overlooked. I show you to-night the jaw and antrum tumor of this patient sent me by Dr. Howe about seven years ago upon a shrewd suspicion. It proved spindle-celled sarcoma, was excised, and remains cured. The use of a stout needle in this case, held in a firm holder, at once revealed decalcification of the bone. This you can verify for yourselves upon this specimen. The electric-light test also showed the antrum filled on that side. Another case, sent me last December by Dr. W. C. Dears, ex-president of the First District Dental Society, presented nothing but a very trifling swelling of the bony roof of the mouth; but the needle test showed, where there should have been almost stony hardness, a softened area, about as firm as articular cartilage and shading gradually into the surrounding dense bone. This area was con-

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siderably larger than a silver dollar and irregular in outline. I operated upon her at the Polyclinic Hospital in December, 1903, removing by drill and rongeur the softened area, also about one centimetre of dense bone beyond, for safety, and of course the same extent of periosteum and mucous membrane. I could then have passed both thumbs into the nose through the gap so left. Professor Jeffries, pathologist at this school, pronounced the pieces of softened bone sent him typical carcinomatous.

At first, after healing, this lady wore a temporary plate, for obvious reasons; but by continuous maintenance of unhealed edges, thus inviting growth by granulation, I have almost closed the gap. It is now not larger than the head of a pin. She is courteous enough to be present to-night for your examination. So far as I can ascertain, early decalcification, permitting successful use of the needle test, is the rule rather than the exception; but it has not heretofore been recognized that such is the case. I have proved it in a considerable number of instances now; but one each of sarcoma and carcinoma of the upper jaw suffice to-night to remind you of it.

As to cancer of the tongue, unquestionably neglect of decaying teeth, sharp-edged and persistently irritating the tongue against their lingual surface, constitutes the chief predisposing cause. The cancer begins almost always at the edge of the tongue, continually chafed by such a tooth; and here, as in epulis, or, indeed, any other soft growth, it is wise for the dentist to inject a few drops of, say, one per cent. solution of cocaine, and then with curved scissors and forceps remove a small piece for the opinion of an expert in pathology. Then you will know what to expect, as to prognosis, after your surgeon has operated; and this report will also be his guide as to how extensive must be his excision.

Turning to treatment, we may put it rather concisely by saying that as yet there is no known means of a medical nature which is curative of malignancy; although arsenic pushed as far as is safe, by hypodermic, unquestionably slows and even checks the growth for a time of certain forms of sarcoma.

Prompt and wide excision remains our only safeguard, and by early diagnosis you have it in your power to save many lives through wise advice not to delay operation. But if the tumor be too extensive when first seen, or if it be so placed as to make excision anatomically hopeless, then our resources are either radium, X-rays, or Finsen light, naming them in order of speedy efficacy;

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or in just one instance, certain fusiform-celled sarcomata, the Coley antitoxin treatment; and finally my own plan of attempted starvation by depriving the tumor of its nourishment.

Regarding the use of radium and X-rays, doubtless Dr. Franklin will speak fully; but it is the opinion of surgeons that where excision is possible it is unwise to delay. There have been some really brilliant cures by these means; but, on the other hand, I have seen several cases go from bad to worse, and beyond hope of excision, during the delay of several weeks or longer with X-ray treatment. We cannot yet say why one case is helped and another is not. Apparently radium or X-rays are more hopeful in sarcoma than in carcinoma; but even in the latter I have noted a marvellous relief from the agonizing pain of cancer of the bodies of the vertebræ by placing a small radium tube of great power for an hour in contact with the back. Fully twenty-six hours of freedom from suffering followed; and this could not have been merely psychical, for the patients did not even know that anything unusual was to be tried.

Our wisest plan, in cases still operable, is to excise; and after the wound has healed, to begin X-ray or radium treatment several times a week for a month or more, hoping in this way to prevent recurrence. Of late I have been following this plan quite regularly; and so do most other surgeons, I think; and not alone about the mouth, but after removal of the uterus or breast for cancer, or, indeed, wherever it may chance to have been.

But if the tumor cannot be excised, and if the other two plans indicated have failed, what then? Are we at the end of our rope? In the region supplied by the external carotid we are not; and it means much to a patient to know this, and thereby to substitute for the certainty of death once more the uncertainty of life!

When first I began experimenting in this unknown field, just nine years ago, I feared that attempted starvation of malignancy would result also in starving the nose, tongue, or other normal parts. Fortunately, this is untrue; and we now know that normal flesh is able to survive with surprisingly little blood—much less than is necessary in order to permit so very vascular a thing as a cancer to continue growing. Also, it was demonstrated that no good would result from merely tying the external carotid on one or even on both sides. Nothing short of complete excision of both these arteries was effective—doing it for safety at two different periods of time.

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At present the writer has excised the external carotids in nearly sixty instances. The operation is quite surprisingly safe. If the patient is not badly cachectic, and if the surgeon is not so unwise as to attempt removal of the growth at the same sitting, there ought to be not over five per cent. of mortality. And simple ligation of both external carotids should have hardly any mortality at all.

What are the results?

In carcinoma, which spreads, as we all remember, not through the blood-vessels, but through its lymphatic channels, the results have been disappointing. Even here, however, we can expect with some confidence a considerable degree of shrinkage, but lasting only a few weeks or months,—up to a year in one case, who otherwise would certainly have died within a month. But in sarcoma there is reason for a more cheerful view; and, remembering that this malignant tumor spreads by its blood-vessels rather than its lymphatics, one could guess, *a priori*, that sarcoma would be better controlled by the starvation of blood than would carcinoma.

In Butlin, "On Malignant Disease," round-celled subperiosteal sarcoma of the jaws is considered hopeless, whatever we do; and yet in my Gross prize book are recorded two cases of this nature which have remained shrunken for much longer than the Volkmann period of three years, after which we may with some degree of certainty claim a permament cure, and which still remain quiescent. The tumor did not, of course, disappear, but it became much smaller, harder, and inactive. In several other instances of sarcoma there has been only a temporary checking; but this is generally longer than we have learned to expect in carcinoma. We must recollect that if a growth is so situated that it can get blood from the *internal* carotid or its branches,—about the orbit, for example, —the prognosis is necessarily bad. Of course, we cannot tie off the internal carotid too, for this would be useless unless done on both sides, and that would kill the patient promptly from anæmia of the brain. (Roughly, the internal carotid may be said to supply brain and eye; the external carotid all parts of the upper neck, and of the head except as just stated.)

Here in New York about a dozen members of the New York Surgical Society have tried my plan, and sent me their results, all of which have been published. In every instance of recovery from the operation itself cancer—*i.e.*, carcinoma—has been the form of malignancy; and, as it happens, in no case sarcoma as yet. This

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is unfortunate; and in fairness to this plan it is evident that it should be given a trial in sarcoma.

I trust it is plain to this society that this operation is not recommended by me for trial except as a last resource—after other things fail; and since a coffin is the only alternative, surely it is worthy of trial. In many instances patients are eager if only for a few weeks' longer life; perhaps for business reasons, to straighten out their affairs; and this at the very least we can give them. Again, in a case inoperable through size, and yet not extremely so, it is quite likely that we may be able, because of a few weeks' shrinkage, so to reduce the mass that it can safely be subjected to thorough work by the knife. I have within the past fortnight received from Professor J. Chalmers Da Costa, of Philadelphia, the account, sent me for publication, of a case of this very sort, refused as impossible of excision by two other prominent surgeons, but made easily operable by the starvation plan; so that after a few weeks' shrinkage Dr. Da Costa safely cut out the now shrunken tumor.

These points, then, we can surely claim for this method of the *dernier ressort*, and, in addition, in sarcoma, in some cases a real and permanent cure, in the sense that the shrunken mass has remained shrunken for years, and, so far as I know, permanently. The case sent the writer by Dr. Howe is such an instance, definitely cured; only there we could excise the tumor as well as the carotids.

In two cases in my book, of especial interest to you, as involving the lower jaw, one detail of the operation I must particularly mention and recommend. This is, upon completing the excision of the external carotid, to do a short, blunt dissection in the front of the wound high up, thus exposing the inner surface of the ramus and the inferior dental nerve and artery as they are about to enter the canal. The artery and also its mylohyoid or main branch, at this point easily seen, are tied. Thus we deprive the bone of a free anastomosis, for the inferior dental, coming from the internal maxillary, anastomoses freely through orbital branches with the ophthalmic from the internal or deep carotid. In cases of lower-jaw malignancy starvation, where this ligation is omitted, we can well see how the excision of the external carotid alone would prove almost valueless. This step does not add more than a few minutes to the length of the operation. Finally, in each of these cases an inch or more of the inferior dental nerve was excised; for, in case

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the growth in the mandible should start up again at some future time, at least we have made sure by this means that there will be little or no suffering. Of course, it is essential that this be done upon both sides of the neck, just as with the work upon the arteries; otherwise little is gained.

In conclusion we may claim the following advantages from the starvation plan in the external carotid area, in cases wisely selected.

1. In some instances of sarcoma it saves life by permanent shrinkage of a tumor too large to excise, or so placed that this is impossible.

2. In all instances surviving the carotid excisions there is a prolongation of life not otherwise possible of accomplishment; even in carcinoma this is true. This may in unfavorable cases be only a few months' gain, but patients are grateful even for this time in which the better to arrange their affairs.

3. Every operator has agreed that one striking effect is the lessening of pain, which is a prompt result of the anæmia produced.

4. In some instances the shrinkage permits the removal of a tumor not possible of excision because of its size and vascularity at first.

RADIOTHERAPY IN SOME MALIGNANT CONDITIONS OF THE MOUTH.

BY MILTON FRANKLIN, M.D., NEW YORK.

THE now almost universally accepted theory of the action of the X-ray upon the human organism supposes that in all tissue exposed there is effected a high degree of stimulation, which, when continued for a time disproportionate to the resistance of the affected tissue, assumes the proportions of an inflammation, of gradually increasing severity, finally ending in sloughing and necrosis.

Whether the tissue be normal or pathological, whether the result be beneficial or destructive, the action of the ray is the same, and can be said to differ only in degree. Assertions that there exist a distinct curative and burning action are erroneous.

A consideration of the phenomena which occur in an area that has been exposed to the action of the rays will elicit the fact that they strikingly resemble in character and sequence those of typical

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classic inflammation. There is the same congestive hyperæmia, followed by the slowing of the blood-current, diapedesis, and vascular exudation, with their accompanying alteration in the vascular walls. There is the increased flow of leucocytes to the part and the infiltration of the tissues by them. These changes are followed in turn by the other well-known changes of inflammation, and may extend through the stages of fibrinous exudation or even to the formation of pus followed by necrosis with sloughing. The causes of inflammation are various, such as traumatism, the action of strong chemicals, heat, electricity, and the X-ray. Each of the different causative agents gives rise to a somewhat different train of phenomena, and while the course of inflammation is in the main the same in each, the different causes may be generally recognized from the resulting inflammation. So also in the case of the X-ray, there are certain peculiarities which render the character of the inflammation slightly different from the rest.

This difference, as far as can be deduced from facts thus far known, consists in that the action commences generally only after a varying period of latent inactivity, that the effect seems entirely due to action upon the nerve terminals, and that the resolution of the scar so closely resembles that of healthy tissue that it is unlike any class of scar heretofore observed, both in absence of tissue loss and of tendency to hypertrophy.

Besides this action in causing inflammation through direct stimulation, there is the almost paradoxical coincident inhibitory effect upon lower forms of cell life. This action has been so certainly established that I shall not attempt to detail the experiments which have led to a knowledge of the fact.

In the main these effects are common to the X-ray, the ultra-violet ray as applied by Finsen, and to the emanations of radium. In the case of the X-ray the destructive action is dominant; in the case of the ultra-violet ray there seems at the present time to be strong reason to suppose that the germicidal factor plays no inconsiderable part, while the ability to cause the growth of almost normal new tissue in the area formerly occupied by the diseased tissue is quite remarkable, excelling even that of the X-ray. In the case of radium there has been so little evidence up to the present time that is likely to prove of any therapeutic value, that I shall not consume the time or space necessary to discuss it. At the same time it may be well to point out that on account of the small

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size of the tubes, combined with their independent activity, apart from any connection with an outside source of electricity, they might prove of interest in conditions of the mouth if they are ultimately found to possess any value in medical science.

In considering which method to use when dealing with a malignant condition, much judgment should be exercised. The disadvantages and limitations of operative methods should be carefully compared with those of the X-ray, and the method chosen which, in the case under consideration, offers the greatest number of advantages and the fewest disadvantages.

In the treatment of diseased tissues with the X-ray, it should be remembered that all tissues are affected in the same way, the action being the same upon healthy as upon morbid tissue. The different effects are attributable, in the main, to the lower vitality of the latter. The changes that are gone through follow each other with comparatively greater rapidity in the less resisting tissue, while the normal tissue is but mildly stimulated. Thus the stage of sloughing and cell proliferation may be reached in the tumor, while in the adjacent healthy tissue, equally exposed, there may be only mild irritation, or, at the most, burn of the first degree. At the same time the retarding action upon lower forms of cell life should be taken into consideration as probably inhibiting the growth of the neoplasm.

The advantages of surgical measures over the X-ray may be briefly summed up as follows:

1. Celerity. The whole diseased tissue as well as the threatened tissue may be removed at once, while in the case of the ray, weeks, months, and in some few cases a year, or even more, has been necessary.

2. Conservation of the patient's strength. By removing from the body, at one operation, the whole malignant growth, a great drain upon the patient is avoided, together with the constant danger of metastasis.

3. The removal of the growth from the body by an outside route instead of causing it to be eliminated by the body organs, with the consequent accompanying autointoxication from the presence of the degenerated noxious tissue products. The strain upon the eliminating organs and the danger of metastasis, which it is now generally accepted is increased by the action of the ray, is avoided.

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The considerations in favor of the ray method are briefly as follows:

1. Avoidance of surgical shock and anæsthetic complications.

2. Better ability to differentiate, and assurance that only the diseased tissue will be destroyed.

3. Better appearance of the resulting scar, which in the majority of cases so far resembles the normal tissue as to almost entirely escape detection.

Considerations of locality will in a measure determine which of the two methods is to be preferred in some cases, it being remembered that the ray cannot be focussed, and that the tissue surrounding the area to be treated should be protected as far as possible from the action of the ray.

In deep-seated conditions the ray as a curative agent cannot be too strongly condemned. The necessity of traversing healthy tissue by the inflammatory rays subjects them to the great danger of burn, with the accompanying inflammatory changes. Besides this the delicate nature of the lining membranes of the bodily viscera renders them liable to so great irritation as to endanger life. Besides this there is no authentic case of cure of deep cancer at present extant.

The determination of which method is to be used in any instance should be based upon a consideration of the features of the case in connection with the characters of the methods available.

In general terms cases in which the X-ray is to be recommended are those in which (1) the condition is essentially superficial; (2) where the loss of any great amount of tissue would be serious; (3) where there is little likelihood of other organs being involved through metastasis; (4) where cosmetic considerations outweigh all others; (5) where time is a negligible quantity and does not add danger; and (6) where the case is for any reason inoperable. In general all other cases are preferably treated by operative methods.

I make mention here of only those conditions of the mouth in which, in my opinion, there is nothing to be gained by employing the radiotherapeutic in preference to the operative method. There are numerous other cases where either some difference of opinion exists, or the ray is generally accepted as inapplicable.

Epithelioma of the mouth, when situated on the edge of the lip, is frequently better treated with the ray than by other methods.

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Here the loss of tissue should if possible be avoided. The condition is among the most amenable to treatment by the ray, and the superficial character renders it the more so. In cases where there is much involvement of the submaxillary glands, while it is the experience of some practitioners that the size of the glands decreases simultaneously with that of the lesion, it is better practice to extirpate the whole of the threatened and diseased tissue and then apply the ray for the purpose of preventing recurrence. Where the epithelioma involves the tongue, it is preferable to use the rays where conditions do not specifically contraindicate. Here any loss of tissue is followed by grave consequences, and the results in cases that have been treated by the rays have been such as to render the method of unquestionable value. In cancer of the larynx or pharynx, notwithstanding some reputed cures, it is certain that there is little to be gained by using the ray. Because of the impossibility of applying the rays direct, but only through the tissues of the neck, it is doubtful if any benefit can be obtained without seriously impairing the tissues traversed. The ray may be used after the operation to lessen the likelihood of recurrence. This is in no way inconsistent with anything that has been said regarding the danger of raying deep-lying structures, as it is necessary to apply the rays only a few times to obtain reasonable assurance.

In noma the results of raying have, on the whole, been of negative character. Here the utmost despatch is needed in ridding the mouth of the offending mass, as any delay is apt to result in irreparable loss of tissue or even of life.

Catarrhal and croupous stomatitis, though not malignant diseases, are worthy of mention here because of the striking manner in which they respond to the ultra-violet treatment of Finsen. In the former condition the degeneration of the epithelium and the formation of pus cease after a few treatments, and the substitution of a new membrane follows speedily. In the croupous condition the false membrane melts away under the action of the light, and is followed by no perceptible scar. Where there has been tendency to necrosis, there appears a cicatrix after the cessation of the morbid process, which closely resembles the normal tissues.

Tubercular stomatitis is readily influenced by the ultra-violet ray, and as there is rarely any communication of the process to other parts of the body, there is little danger in a prolonged treat-

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ment. It is therefore preferable to proceed by phototherapeutic methods instead of resorting to operation. The X-ray also exercises a marked benefit upon these cases, but on account of the danger of burning the face, the ultra-violet rays are to be preferred.

Papillomata are best treated by the X-ray when they are of small extent, and by operation when large. The ray is recommended, as the results are obtained in small tumors before the lining membrane of the mouth is affected, and in these cases this method is simpler than operation.

Angiomata respond very readily to the action of the X-ray, the internal walls of the vessels undergoing a change resulting in early occlusion, followed by atrophy and final disappearance of the whole mass. The elaborate measures necessary to prevent excessive bleeding in all operations render them less to be desired in these conditions.

To conclude: it may be stated that in the present condition of the science the radiotherapeutic method may be used on some few cases in preference to all others; in some cases where the operative method, *cæteris paribus*, would be preferred, but in which on account of existing complications cannot be performed; and in nearly all cases, after operation, to minimize the possibility of recurrence.

Regarding the value of the ray in post-operative cases, for the purpose of minimizing to the fullest extent the likelihood of recurrence, it may be stated that herein lies the most satisfactory feature of the whole method. Scarcely any difference of opinion exists at all among surgeons who have made a practice of having their cases undergo a course of X-ray exposures after operation, as to the influence in preventing recurrence.

DISCUSSION.

Dr. Dawbarn.—In the main I have nothing to differ from Dr. Franklin's very interesting paper, except in one respect. If I understood him correctly, in cancer of the tongue he would advise using the X-ray instead of the knife. I have known of two instances of cancer in this locality where the patient lost his life in just this manner. There is no exception to the rule that the proper thing to do is to use the knife at once. The doctor refers to the great danger of the application of the X-ray to deep-seated conditions. In this connection the value of the X-ray in locating gall-

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stones is of great value. Also in fractures of the thigh-bone or in fracture of any of the bones it aids materially in properly reducing the fracture.

Dr. Davenport.—I hope, Mr. President, you will extend our cordial thanks to these gentlemen for what they have done for us this evening. Dr. Dawbarn being one of us, perhaps we may take his efforts in our behalf more as a matter of course, though we should not be less appreciative of his many services to this society. From what we have learned of Dr. Franklin to-night I am sure we all hope he will be a frequent visitor.

Dr. Kimball.—In seconding Dr. Davenport's suggestion, I wish to state that while we cannot very well discuss this subject, the society certainly owes a debt to these gentlemen for giving us this information so clearly and forcibly.

Dr. Franklin.—Regarding the point upon which Dr. Dawbarn differs from me, I really do not believe that he differs from me, or that I differ from him, so much as he thinks. While it has been my custom to X-ray cases of the tongue first, at the very first sign of lack of response or of further involvement I turn the case over to the surgeon. A reason why the ray has been used so much in cases that should have been operated upon is to be found in the fact that there exists in the hearts of most women an extreme dread of surgical interference. Cases have come to me in which I have actually begged the patient to place herself in the hands of a surgeon, and insisted that every day the growth was X-rayed the danger was increasing. In many cases they have been obdurate. In many cases they have gone to others who have held out more hope. I know of two cases that have died because they would not allow themselves to be operated upon.

The President.—Before entertaining a motion to adjourn, I wish to tender to Dr. Dawbarn and Dr. Franklin the thanks of the society for their instructive and interesting papers.

Adjourned.

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A MEETING of the Institute was held at the "Chelsea," No. 222 West Twenty-third Street, New York, on Tuesday evening October 4, 1904, the President, Dr. Brockway, in the chair.

The minutes of the last meeting were read and approved.

The President then introduced the essayist of the evening, Dr. N. S. Jenkins, of Dresden, Germany, who read a paper on "A New Porcelain for Prosthetic Purposes."

A NEW PORCELAIN FOR PROSTHETIC PURPOSES.

BY DR. N. S. JENKINS, DRESDEN, GERMANY.

So soon as porcelain enamel had been proved to completely answer the requirements for restoring decayed or broken teeth to health, beauty, and usefulness, I began to occupy myself with the question of producing a porcelain which should simplify prosthesis and make porcelain crowns, bridges, and continuous gum work easy to the general practitioner. It was a task, lightened, indeed, by previous experience, but presenting difficulties of no inconsiderable magnitude. The materials employed in making dental porcelain have hitherto been worked somewhat crudely. It has been rare to find a completed product sufficiently free from foreign matter or possessing the desired homogeneity. For this the manufacturers are not to blame. Their object has been to supply what they believed the profession to demand,—viz., cheap materials with which fairly good results can be obtained. No manufacturer, whose legitimate purpose is commercial, can be expected to carry on year-long experiments, at large expense, in the vague hope of supplying a superior material when he has no reason to suppose that there is, or will be, a demand for it. Our debt to the dental manufacturers is exceeding great, but there is much work which only a dentist in actual practice can do, for only he can know exactly what the practising dentist needs, and therefore it is vain and unreasonable to look to any other than a dentist to accomplish such work.

I have been so fortunately situated as to make experiments in porcelain my natural contribution to the progress of our pro-

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fession, and it has been solely owing to these favorable circumstances that I am able to present to you to-night a product which seems to me to completely solve the question of porcelain prosthesis. For more than two years I have been able to produce it in the small quantities of laboratory experiment, but only recently has it been found possible to manufacture it in larger quantities. This delay, is, however, no cause for regret. During this time I have not only been occupied with the question of manufacture, but also with the methods of applying this material, and those methods are now well systematized. At the very foundation lies the importance of a proper alloy of platino-iridium. For plates, for caps and bands, ten per cent. of iridium is essential. For posts, twenty per cent. of iridium is necessary. Pure gold should be used for solder.

Prosthetic porcelain begins to melt at 950° C. That heat may be continued up to 1000° C., at which point the electric current should be suspended, and, usually, the piece can then be cooled rapidly. The melting-point of gold is, approximately, 1075° C. At a temperature of 1000° C. not only is there no danger of remelting the solder or volatilizing the gold, but under this heat the above alloy of platino-iridium does not bend nor change its shape, and if this temperature is not exceeded, the life of the platinum wire of an electric furnace is greatly prolonged. The heat should be determined by a pyrometer. One cannot too greatly insist upon this point. Here is a simple, scientific method, through which it is possible to obtain exact results, without exception. No man who does this class of work, and every dentist ought to do it, can afford to leave anything to chance or to imagination. To be sure, through experience, one can easily learn to work prosthetic porcelain without a pyrometer, but, with the greatest care, the greatest expert will sometimes fail to recognize sudden changes in the electric current, which the pyrometer infallibly records.

Prosthetic porcelain may be used alone, but most dentists will find it desirable to use it in combination with artificial teeth. It combines perfectly with all porcelain teeth, in any proportion, from a delicate jacket crown to a massive molar. It can be used to supplement, to support, to extend, and to broaden teeth, or even to restore the lost glaze of an artificial tooth, with perfect confidence. It is far stronger than the strongest artificial teeth, and in

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a close bite can be safely used in a thickness of three millimetres. Crowns and bridges, which were formerly made of gold, can be made of platino-iridium, and so built out with prosthetic porcelain that no suggestion of artificiality can be discovered, and the work will be stronger and more cleanly. In fact, it enables any capable dentist to completely conceal his art in prosthesis and to restore the mouth of his patient to its original beauty and usefulness, for he can obtain, with certainty, any desired color, any necessary form, a density which makes grinding and subsequent polishing possible, enduring strength and hardness, and a brilliant and indestructible glaze. There is no limit to its usefulness or to the gratitude of the patients who have experienced its advantages, and it supplies one more step toward the proper remuneration of an overworked and underpaid profession.

DISCUSSION.

Dr. F. T. Van Woert.—It would be hard to express gratitude at being present this evening and at the demonstration this afternoon. I personally feel under a deep obligation to Dr. Jenkins for his work in this line.

In the early days I was very sceptical as to the practical value of porcelain as a filling-material, and to the present just as sceptical regarding porcelain for bridge-work. But after seeing the demonstration this afternoon I am convinced that I shall have to take the matter up, as there seems a bright prospect for its success.

In the past I have considered porcelain bridges impracticable, on account of the ease with which they are broken. Dr. Jenkins assures me that with his new porcelain there is no such danger. This being so, it eliminates one of the most serious objections. I have thought of late that they might be practicable if set with the Evans cement, which I have found most admirable, in gold bridge cases.

In cases of a break-down, with this cement the bridge can be easily removed, and this, in consideration with Dr. Jenkins's new product, may make porcelain bridges practical.

I cannot see wherein there is very much to say except in commendation of Dr. Jenkins's work. I do not see any chance for a discussion, and I cannot find any fault.

The inlay material introduced by Dr. Jenkins is a very excellent one for adapting crowns to the roots. It will stand grinding and polishing and leave as smooth a surface as when first fused.

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Dr. C. F. Allan.—Dr. Jenkins, with his years of laboratory experiments, pursued with the most patient care and at great personal sacrifice, is an apt illustration of the idea expressed so well in his paper, that "dentists themselves are the best judges of dentists' needs." The first sugestion of inlay material came to the essayist doubtless from his desire to do away with the unsightly display of gold in the mouth, his needs at first being only in the line of æsthetics and the imitation of nature; but he has builded so well that besides accomplishing this great purpose he has given us a material of the very first quality from the point of view of tooth preservation, and especially is it useful for those cases of large proximal and occluso fillings in the back teeth where much contouring is necessary and which could only be done in an inferior manner with gold at an enormous expenditure of time and labor on the part of the dentist and great suffering and nervous strain to the patient. Now, Dr. Jenkins has supplemented this great boon by adding this new material, of which he speaks to-day. He tells us that it is much stronger than the porcelain teeth we use, and will bear a heavier strain than the porcelain bodies.

The flowing of the material as demonstrated this afternoon is all that could be desired; it flows easily, stays put as you want it, and is tough and homogeneous.

It has been the opprobrium of our profession, especially in this country, that we have not imitated nature. All praise now to Dr. Jenkins, who has given us the means for holding the mirror up to nature; and the opprobrium in the future will be the greater if we do not take advantage of such means.

Dr. H. L. Wheeler.—It has given me much pleasure to listen to Dr. Jenkins this evening, and I think he deserves credit for so persistently advocating the æsthetic in dentistry. His constant endeavors can hardly fail to have a beneficial effect in persuading members of our profession to try to imitate nature more closely, and so minister to the beautiful; and as a man I admire him.

Upon reading this paper over several times, in the hope of finding some scientific statement that would admit of discussion, I have been unable to do so. In the first place this is an unsupported statement of an interested party and owner of a secret formula advocating this article as superior to everything else just as every man has done since commerce began. Under the circumstances it is difficult to discuss this paper as scientific papers usually

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are discussed. But there are some statements in this plea for the use of prosthetic porcelain to which I wish to call attention. For instance, in the statement that "materials employed in making dental porcelain have hitherto been worked somewhat crudely," I suppose he means porcelain used for dental purposes. There might be some difference of opinion concerning this if some of the other manufacturers were heard from. It is doubtful in my mind if prosthetic porcelain, so called, is a porcelain at all. I submitted a sample of porcelain enamel, which fuses at about 200° F. below prosthetic enamel, to one of our most distinguished and possibly the greatest authority on porcelain in this country, and he pronounced it glass. I have tried strenuously to get samples of this material of Dr. Jenkins's to experiment with, but find it is not obtainable. Its fusing-point, 1075° C., which, converted into Fahrenheit according to the essayist's statement, is from 1678° to 1768°, which is nearly or quite 200° below the lowest of the highest fusing bodies, would indicate that the fusing-point of the silicates had been considerably lowered by the addition of artificial means, or the doctor is using a silicate, that is, a feldspar containing an excessive amount of potash or soda, or some other alkaline material to lower the fusing-point, or he could, by breaking up and finely pulverizing and rebaking a number of times, secure similar results. In either case the results would not vary greatly. It is not impossible that his statement of its great strength is erroneous, for I am informed by men of ability, whose work is what might be called mineralogical chemistry, that either of the above-mentioned processes decreases the strength of the material. The statement that it can be used safely at a thickness of three millimetres, which, transposed, is about one-eighth of an inch, does not indicate that it has great strength. The inner cusps of bicuspid or artificial teeth are ground much thinner than this and last for years.

As to the question of the gold volatilizing, it is a matter of indifference if it does. I have put pieces of platinum together, using pure gold as a solder and run the heat up to 2600° F. The gold has apparently disappeared, but the pieces of platinum were held together as though they were one piece. The statement that the fusing-point of gold is 1075° C. (1903° F.) is, according to such authorities as I have been able to find, 113° out of the way. They give the fusing-point of pure gold as about 2016° F. Now, our essayist may make mistakes, as this shows, and it would not

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be the first time a good man had been in error, and it seems to me that it might be well to be cautious in the use of this material, at least until it shall have time to prove its merits, if it have any.

That the material may prove to be useful does not in my estimation warrant its unlimited use until its lasting qualities are better known. Although proprietary compounds may be very useful and of great benefit, the burden of proof is upon those who advocate their use. In regard to iridio-platinum for full upper plates, I have known of this being used in artificial dentures, and although there is great difficulty in swaging it, it can be used successfully where a vulcanite attachment is used. But as for heating it, in order to solder artificial teeth to it, the evidence thus far seems to be that it will spring badly and ruin the fit; hence I doubt its practicability.

Dr. Houghten.—I would like to ask Dr. Jenkins what the percentage of shrinkage of his porcelain is?

Dr. Jenkins.—Every porcelain has a certain amount of shrinkage if it is really fused. You can take some so-called porcelains and subject them to a very high degree of heat without fusing them; indeed, there are so-called porcelains that no amount of heat will thoroughly fuse. It is always a question of the way in which the materials have been treated. In order to have a porcelain adapted for practical use, it must fuse to a very great extent, and such a porcelain will shrink. The percentage of shrinkage of this porcelain is very similar to that of the inlay porcelain or of any porcelain that is thoroughly fused. However, this is a thing that is of no great consequence in the practical working of the porcelain. Shrinkage is so uniform in any one grade of work in ceramics that no very great attention is paid to it after the first experiments with any particular body are made. It makes some difference as to how moist the piece is. In this material I am presenting to you the degree of shrinkage has never been measured. It is not really a practical question.

Dr. George S. Allan.—I should like to hear a little more definitely from Dr. Jenkins in regard to this iridio-platinum that was negatived by Dr. Wheeler. Dr. Jenkins says that iridio-platinum with ten per cent. iridium, is essential in work with this prosthetic porcelain. As I understand it, he has had two years' actual practice with this metal. The more or less constant use of a material is pretty conclusive as to its merits. When Dr. Jenkins

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first made the statement to me that he used platinum with such a high percentage of iridium in alloy, the question naturally came to my mind as to how this could be swaged. Dr. Jenkins tells me that it is not so difficult a matter. He uses Melotte's metal dyes. He did not allude to this springing quality mentioned by Dr. Wheeler. All of those present at the demonstration at my office were highly delighted with the simple and easy way in which this porcelain could be manipulated. I know very little about ceramics, and so do not pretend to criticise, but I look upon Dr. Jenkins's two years' use of this material in combination with the platino-iridium base as practically settling the question of its usefulness.

Dr. Gaylord.—I simply wish to add my personal experience with this prosthetic porcelain to what has already been said in favor of it. It is one thing to listen to remarks upon a subject, and another to experiment with your own hands. If any of you will procure some of this material and try it in your own laboratory, you will realize to your own satisfaction its great strength and its perfect adaptation to whatever it comes in contact with. The matter of shrinkage seems to me to be of very little concern. Its great strength and the character of work it will enable us to do is highly gratifying. I believe Dr. Jenkins is too well known to bring forward anything that we cannot endorse. If he indorses it, it is sufficient for me.

Dr. George S. Allan.—Just one more point. All bodies that are used for artificial teeth and continuous gum work are hard and brittle. This body, as I understand Dr. Jenkins, is hard and tough and not as easily broken as former bodies.

Dr. Stockton.—I have always been a kind of hero-worshipper. I like a man who leads. I think that is why I have always been such an admirer of Napoleon. That is why I admire Dr. Jenkins.

I had the pleasure of being at the dental clinics at St. Louis, and the centre of attraction of these clinics was the inlay work. The appearance of this work alone is enough to attract us to it. The only question that comes up with this and all porcelain work is, "Is it strong enough to last?" Whatever Dr. Jenkins tells us we can rely upon, and he tells us that it is strong enough to stand the strain for which it is intended. The interest is so great in inlay work that our humble society in New Jersey, the Central Dental Association, is to have the first clinic it has ever devoted entirely to this work.

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Dr. Palmer.—I cannot let the occasion go by without speaking of this work. Fourteen-odd years ago I was forced to take up a different line of bridge-work because of difficulties with the International Tooth Crown Company. Since that time I have used various bodies for bridge-work, but none which were satisfactory. Some few months ago my attention was called to this porcelain of Dr. Jenkins's, and I succeeded in getting some of it. I have used it in a good many small pieces, and have found it excellent, even using plain rubber teeth without having any trouble whatever. With it I have had so much better results than with anything else that I am delighted. With all due respect to Dr. Wheeler, it does not make any difference to me whether it contains any glass or not; it looks better than anything I have ever used, and I believe it is going to wear better.

Dr. C. F. Allan.—Dr. Jenkins recommends using pure gold for solder. There is nothing better. I have had some experience with platinum gold solder, and it has been very unsatisfactory. It does not flow in the beautiful manner that gold does, and does not begin to be as strong, and as the strength of the framework is essential in the use of porcelain for bridge purposes, I would give this word of warning.

Dr. Jenkins.—I wish to thank Dr. Wheeler for his kind criticism. If he has interested himself in ceramics he must know that the materials of which all the finer porcelains are made are always essentially the same,—silica, feldspar, and kaolin. It is only a question as to how they are prepared, in what proportions they are compounded, and how they are fluxed. The production of a high-fusing porcelain is an exceedingly simple matter. As ordinarily produced, the high-fusing porcelains are but the threshold of a perfect material. There goes into this porcelain that I have prepared for prosthetic work at least twenty times as much work as is necessary to produce the ordinary high-fusing body. It is so complicated a process that if I were to take Dr. Wheeler into my laboratory and give him the materials and set him to work, I venture to say that it would take him two years before he could learn just when and how to unite the different ingredients. These things can be brought out only by painstaking and complicated experiments. In producing your results in this work you must simply pay no attention to time or expense. It is not only a question of the proportion of the ingredients, but of the different degrees of fineness as well.

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Referring to the melting-point of gold, I beg leave to say that no one in all the world has yet been able to say what the absolute melting-point is. I believe that the Germans are conceded to be authorities on this subject, and in Germany it is stated to be 1075° C. There have been within the last few years a series of experiments made in England, and it has been announced there that the melting-point of gold must be conceded to be between 1064° and 1065° C. But the balance of authority I may say is with the German chemists who state it at 1075° C.

What I have endeavored to produce is a material that the ordinary man can use. When I spoke of high-fusing porcelain I did not mean to imply that it is crude, and of course it is a porcelain indispensable in certain forms of work, as, for instance, in the manufacture of porcelain teeth where an indestructible form is necessary. The requirements for a prosthetic porcelain are essentially different. It must be a porcelain which, when fused, will flow into the minutest crevice, which shall perfectly attach itself to the porcelain tooth around which it is placed so that it cannot be separated with violence. You can break away the tooth, but cannot break away the prosthetic porcelain. It is also of great importance that it possess great tenacity. There is an enormous difference too between the kind of glaze a porcelain takes, whether it is produced as a natural result of the fusing of the material or whether it is an enamel put on after the piece is practically finished. The prosthetic porcelain is of one consistency throughout, which makes it exceedingly enduring. You have all seen pieces of continuous gum baked after the old method, where the piece was first biscuited and then covered with a layer of enamel, and where after a time the enamel had worn off leaving the more porous porcelain exposed, and which in time became offensive. This cannot occur with the prosthetic porcelain, because it is the same throughout.

There were so many things mentioned, and there are so many things about it that I could tell you did time permit, that I shall have to ask you to take it upon faith. I can only tell you that I believe you will find it an indispensable adjunct to your practice, and that by means of it you will be able to eliminate any appearance of artificiality from the mouth. Even a clasp can be so completely covered up by this material that it becomes invisible. Of course, it must be a rigid clasp.

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One word regarding platino-iridium. There is no question at all but that a properly alloyed platino-iridium can be swaged up. If one wished to strike up a cap, a band or half band, or a plate, either full or partial, ten per cent. platino-iridium can certainly be worked, perhaps not quite so readily, but when accomplished it is stiff and does not change with soldering or repeated meltings without any investment. In these cases there is no union between the alloy and the porcelain. Only perfect adaptation. Perhaps an attachment might be made by roughening the surface of the platinum, but it is seldom necessary.

I am very much obliged, gentlemen, for the patience with which you have listened to me.

Upon motion of Dr. F. Milton Smith, the Institute expressed to Dr. Jenkins its gratitude for his valuable discussion and demonstrations.

Adjourned.

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A MEETING of the Institute was held at the "Chelsea," No. 222 West Twenty-third Street, New York, November, 1904, the President, Dr. A. H. Brockway, in the chair.

The minutes of the last meeting were read and approved.

The regular business of the evening was opened by Dr. J. F. P. Hodson, who presented several useful appliances and methods.

Dr. Hodson.—I shall present this evening a number of little helps that are familiar to me in my practice, but some of which may be new to you.

First.—A combination of flexible steel holding point, with ball and socket jointed mirror, to hold in the left hand while starting gold fillings in deeply placed approximal and posterior cavities, until the fillings shall have become self-anchored.

Second.—A little thin, saucer-like attachment to be slipped over the back and edge of the mouth-mirror for catching pieces of amalgam as it is being carried into a cavity, or bits of gold while cutting out a gold stopping, instead of letting them drop into the mouth or on the dam. It can be slipped on or off from the mirror in an instant. Every operator should accustom himself to operating in the mirror, held in the left hand to reflect the operation; it transforms difficult of access, posterior cavities into easy ones, and even when not so needed, is still of great value in the left hand for throwing a ball of light upon the work.

Third.—An old engine hand-piece that has been locked, making an excellent socket for a hand bur.

Fourth.—For very many years I have had manufactured for me the round cedar sticks for cleansing teeth. I still use them for that purpose, and I have found, when they have worn short, that a convenient way of lengthening them is to put them into an ordinary penholder with the pen part removed.

Fifth.—A pair of amalgam carriers, that I use more than all my other amalgam carriers put together, one for forward and the other for backward work.

Sixth.—In connection with amalgam, some know, and some do not seem to, how to trim the margins of amalgam stoppings under the gum, judging from the ragged masses which we often see hardened under the gum. The best instrument for that purpose is a thin, round, flexible, old-fashioned canal-plugger, which, carried

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along that edge, will clean the margin perfectly, and, followed with a thin, flat burnisher, will leave as perfect edges under the gum as above it.

Seventh.—A mouth-mirror with the glass broken out makes an excellent scoop for catching up bits of amalgam or gold from the rubber dam.

Eighth.—A rubber apron, that I always adjust the moment the patient gets into the chair. A so-called improvement has been made upon mine by some one, consisting of a pocket to catch the saliva and hold it. I think that is merely filthy. With this apron the patient's clothes are kept neat and clean from drops of water, saliva, etc. The patient is made comfortable with the thought that her clothes will not be spotted. The white towel is of course placed over it. I get this material by the yard at a very small price, and all the work of making them consists in sewing on the neck tape.

Ninth.—To go back to amalgam stoppings, for finishing them off and wiping margins I use a piece of wet spunk instead of cotton, as it gives a much finer grain and is much smoother.

Tenth.—The paper points for drying root-canals that I presented to you a good many years ago are an illustration of a principle that I apply as such very largely in my practice,—the principle of capillary attraction. It is astonishing what can be done by means of it. In drying out root-canals a piece of cotton on a broach will push material ahead of it, possibly carrying the septic material beyond the apex of the root, while these paper points made from bibulous paper will attract the moisture and absorb it instead of driving it ahead. Syringing a root-canal will never cleanse it, but three or four floodings alternated with the paper point absorbings will certainly do so. The points are made from the French bibulous paper. They are also sold by Johnson & Johnson.

Eleventh.—The principle of capillary attraction suggests conditions allied thereto. For instance, I never find it necessary to make retaining points in building amalgam on to an old amalgam stopping for the purpose of repairing it. It is sufficient to first make the surface of the old filling, in that part where the repair is to be made, perfectly bright and clean, and then tinning that surface with a portion of very thinly mixed amalgam. The new amalgam takes perfect hold of this, being a cold soldered joint.

Twelfth.—I also use this principle in filling thin, winding root-

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canals, and, in fact, all others as well. I fill my root-canals with chloropercha and gutta-percha. By wetting a fine smooth broach with the chloropercha and carrying it to the end of these small canals, and in this position touching it with a drop of chloropercha, capillary attraction will surely carry it to the end of the canal. This, however, is in my hands only the preparation for the root-filling. The chloropercha is merely to cement the gutta-percha point that I stick to the end of a nerve-canal instrument and gently carry to the end of the canal. The root is thus filled surely to the end, no air-bubbles, and the minimum of the chloropercha.

Thirteenth.—Many years ago Dr. Merriam showed us a method of making gutta-percha stoppings stick in wet cavities by taking a piece of gutta-percha on the proper instrument, warming it, and carrying it to the cavity immediately after having dipped it in oil of cajuput. As the surface of such gutta-percha stoppings will not wear well, it is best to use this method only for very temporary stoppings or for the first part of a stopping where it is intended to dry out the remainder of the cavity and fill with a stronger gutta-percha. I have sometimes filled the collar-like cavities around the necks of teeth with a modification of this method, drying out the cavity as well as possible, then touching with the oil of cajuput and applying the stopping. It is astonishing how well the gutta-percha will stick with this method.

Fourteenth.—Another bit of advising born of my own experience as a patient. When I was a boy student a dentist who at that time stood in the very front rank for ability and skill, while condensing a gold filling in my mouth, brought all his power upon the instrument held *off hand,* and the instrument slipped and went through my cheek. Since which time I have never made even the smallest move in the mouth which was not guarded by a fulcrum or rest, formed by the third finger end on the teeth for fingers grasp, and by the thumb for the fist grasp of the instrument, and I can truthfully say that in consequence I have never in my life let an instrument slip to hurt a patient.

Fifteenth.—Speaking of slipping instruments reminds me of a matter somewhat akin to it. It may happen at very rare intervals, even with the most skilful operator, that in the hurried changing of an instrument during an operation he may catch it in the rubber dam and make a rent. The need for a stopper is most instant and urgent. I suggested such a remedy many years ago. It consists of

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a section sawed from a cork, filed oval on both sides, and a deep groove running all round the edge, thus making it like two thin oval buttons placed back to back. A half-dozen sizes kept at hand will fit all possible rents, and the proper-sized one quickly stretched therein will effectually dam out all moisture,—will hold its place perfectly and all without being in the way, even though it be in the immediate vicinity of the filling.

Dr. G. W. Weld.—I wish first to mention one little point in connection with Jenkins's little tray for fusing inlays. The trays that come with the Jenkins outfit are composed of some composition other than platinum, and repeated heating quickly burns them out. I have remedied this by riveting to the bottom of the little pan a platinum disk. I find this will stand the heat splendidly. It will be necessary to put five rivets in; this makes practically a platinum pan.

What I wish to show specially is home-made impression cups for porcelain inlays. The subject is not entirely new, and these cups have been placed upon the market, but I have found them of little practical value to the dentist. We all know that the foundation of a perfect inlay is a correct impression or a correct matrix, or both. If the matrix can be taken directly from the cavity it will save time, and is often done. I have done it myself, and have had beautiful fits. But there are thousands of cases where this cannot be done. But with a correct model of the cavity set in a piece of plaster it is very easy to tease the matrix away from it, whether it be of gold or platinum. Therefore, when I can I use an impression. It follows that to take an impression of a cavity you must have a proper cup to do it with. Take, for instance, two approximal cavities between the central incisor teeth, where the front plate of enamel is intact but extremely thin. Porcelain inlays are indicated here for the reason that there is great danger in fracturing the enamel walls in putting in a gold filling. A right and left impression cup is here needed. They are made of platinoid, but can be made from German silver. A little piece of the platinoid is cut out the proper size and shape, and to this is soldered another piece of the same material to serve as a handle. In this way a perfect impression cup can be made, using the smallest quantity of impression material possible; a surplus being as bad as an insufficiency. The impression is then set with the convex surface upward in a little plaster, and after that has hardened the surface

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is painted with talcum powder. Stiff Harvard or Ames cement is then pressed down on the impression and allowed to remain for some time. When hard, the model thus made is set in a piece of plaster. Then the gold can be easily teased away without injuring its shape.

The most simple cavities are the cavities on the labial surfaces of the front teeth. Here it is easy to take the matrix directly from the cavity. Indeed, there are cases of compound cavities where I have succeeded better with this direct method. Sometimes it is better not to make the little holes in the cup, designed to hold the material better, thus allowing the cup to be removed first, and taking out the impression afterwards.

Dr. W. D. Tracy.—Inasmuch as this society seemed last year to take such an active interest in orthodontia, I thought it would not be amiss to show some little instruments I have devised to assist in the adjustment of the Angle bands. The set consists of three instruments, which I shall pass around together with a band fitted upon a model. The conditions on the model are somewhat exaggerated for illustration. The working face of the instruments are finely serrated, so that they will not slip when used with heavy pressure to carry this band in contact with the tooth.

Dr. Hodson spoke of trimming the cervical margin of amalgam fillings with a canal-plugger.

In my own experience something more rigid than the instrument shown by Dr. Hodson is necessary, because the amalgam, being packed quite dry, hardens quickly. To meet the requirements of trimming all kinds of fillings on the approximal surface I have had made this pair of right and left trimmers, which I submit to your criticism.

Dr. S. H. McNaughton.—I wish to present some two-angled excavators—hatchets and hoes—which have been very useful to me. In the preparation of cavities in the approximal surfaces of teeth in which plastic fillings are to be inserted, and where it is desirable to save as much enamel as possible as a protection to the filling, by means of these instruments all the angles may be reached and all the decay removed without the necessity of much loss of enamel. The width of blade is three-, four-, or five-tenths of a millimetre, the length of blade three times the width; the first angle (the angle nearest the cutting edge) is twenty-five centigrades (ninety degrees), the second angle is twelve and five-tenths centigrades

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(forty-five degrees)—and should be the length of blade from the first angle; the direction at this angle should be to the left, or to the right, or in same direction as at first angle. These constitute the three shapes and sizes which are indispensable to me.

In filling large occlusal cavities where one or both approximal surfaces are involved, where the walls are frail and badly broken away, especially lower molars, I make use of a combination, filling in the following manner: I use a matrix made from a section of a ping-pong ball. Instead of first placing zinc phosphate over the floor and partly on the buccal and lingual walls, as is ordinarily done, I first pack amalgam against the gingival wall, the matrix to the occlusal edge, and the margins of the buccal and lingual walls. When this has been done I have a cavity with four walls and a floor, which may be filled two-thirds or entirely with zinc phosphate. If but partially filled with the zinc phosphate, it may be completed with amalgam, in which case it has the appearance of an all-amalgam filling. The advantages of a filling of this kind are: The amalgam is keyed in by the cement; it is held while setting in perfectly close contact with the walls, so much so that in removing one of these fillings it seems to adhere to the walls as tightly as does a copper amalgam plug. There will be no washing out at the gingival margin, as is likely to be with zinc phosphate; it holds its shape better than gutta-percha. There are other classes of cavities in which this method or variations of it may be used.

As an investment for soldering I use a mixture of equal parts of modelling clay, coarse powdered pumice, and ground asbestos, which I keep wet in a fruit-jar, by which means it is always ready. It is especially good for small pieces, and it holds very tightly. It does not set. As a support for it a piece of coarse iron wire netting is used. Wax will be burnt off in the heating.

Dr. F. L. Fossume.—Right lower central incisor missing, and patient wearing a small rubber plate with an artificial substitute. This rubber plate impinged on the gums and lingual surfaces of the necks of the teeth which were denuded. The teeth were slightly loose but otherwise in perfect condition.

I inserted a dummy in the following manner: The central and lateral incisors on either side of the space were ground lingually in the centre at the cutting edge, forming a hollow into which pure gold 40-gauge was burnished. Rivet holes were bored near the wall approximating the space. Platino-iridium wire about the

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thickness of the pin in a rubber tooth was forced through the gold into the holes and bent so as to meet the backing of the dummy to be inserted. The gold lining and pin in position, they were tacked together with hard wax and soldered; then they were placed back on the teeth and an impression taken in plaster. The dummy was now ground, backed, and waxed into place. The whole piece was invested and the backing soldered to the rivet wire and gold, with 22-carat solder. Solder was allowed to flow on the gold only along and over the platino-iridium wire. The cavities prepared in the cutting edges were now undercut at sides distally to the approximating space, where the rivet holes were bored. After polishing the backing, the piece was cemented into place and the thin gold hammered into the undercut and built up with gold-foil the same as in any other cavity. The whole thing was then polished and burnished; the only gold visible was a small half-moonshaped filling on the cutting edge on the central and lateral on either side of the dummy.

Dr. F. Milton Smith.—Previous to entering upon the discussion of these various subjects, I have the privilege of presenting to the Institute some radiographs sent me by Dr. C. Edmund Kells, of New Orleans.

While Dr. Kells did not send these for exhibition, I have taken the liberty of bringing them here, that you may get an inkling of Dr. Kells's work in this line.

Dr. J. Bond Littig.—I can verify Dr. McNaughton's statement with regard to asbestos and clay as an investment. I have used for many years a little ordinary moulding sand with asbestos. I put it upon a piece of wire gauze and put the piece to be soldered right into it, and without waiting for it to thoroughly harden heat it up and let the moisture dry out. In ten minutes I can have my piece soldered. I have, as I say, been doing this for many years, and you can find it published in "Catching's Compendium," 1890.

Dr. Chas. O. Kimball.—I have lately encountered a case where the X-ray was of great assistance. A little girl about nine years old presented with a left lateral in a very markedly crooked condition. When we came to get a radiograph of the condition, it was found that the canine on that side, which was yet up in the tissues, was misplaced and was bearing in an abnormal way upon the root of this lateral, causing the peculiar irregularity. It is easy to imagine what my difficulty would have been had I tried to regulate that tooth without knowing the condition causing the irregularity.

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Dr. F. Milton Smith.—I wish to express my extreme gratitude to Dr. Hodson for the comfort and help I have derived from the combination mirror he has shown us to-night. I have used it, more or less, for twenty years.

Dr. F. C. Brush.—Regarding investments for soldering, I have found that a combination of two-thirds plaster and one-third ashes is excellent. It makes a very hard investment that will not change in shape or crack under the heat of the blow-pipe. The ashes should be in the form of the fine powder obtained from ordinary coal ashes.

Upon motion of Dr. F. Milton Smith, a vote of thanks was extended to the gentlemen who so kindly assisted in the helpful entertainment of the evening.

Adjourned.

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A MEETING of the Institute was held on Tuesday evening, December 6, 1904, at the "Chelsea," No. 222 West Twenty-third Street, New York, the President, Dr. C. O. Kimball, in the chair.

The minutes of the last meeting were read and approved.

Dr. Lee Maidment Hurd read a paper entitled "The Radical Treatment of the Maxillary Antrum."

THE RADICAL TREATMENT OF THE MAXILLARY ANTRUM.

BY LEE MAIDMENT HURD, M.D.[1]

THE antrum of Highmore, as we all know, is liable to become the seat of a suppurative inflammation either acute or chronic. Of the chronic, which we are about to consider, nearly one-half are secondary to an inflammatory condition about the roots of the teeth, and practically all the others are of nasal origin. The chronic cases may begin with an acute inflammation which subsides into a chronic condition, or it may be insidious from the beginning.

The more prominent symptoms are a purulent discharge from the nose, sometimes so slight as hardly to be noticeable; in fact, the most frequent cause of one-sided purulent nasal discharge is antrum disease. Nasal obstruction on the affected side, sometimes on both sides, is frequent. Pain around the eye is found in a great many cases, but pain in or over the antrum is rare and is only caused by retention of the pus under pressure or a neurasthenic tendency in the patient. Trigeminal neuralgia, pain in the vertex or occiput, are frequently present when the sphenoid is involved, and pain to the inner side of the eye generally means that the anterior ethmoid cells are affected. Tenderness on pressure over the canine fossa is generally present, but not invariably. Gastric disturbances are frequently present from the swallowing of pus at night; also a bad taste in the mouth in the morning. Sometimes frontal headaches are present, but more frequently infraorbital neuralgia or shooting pains in the teeth. This dentalgia does not

[1] Assistant Surgeon, Manhattan Eye and Ear Hospital.

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necessarily mean that the antral trouble originated in the teeth. The pus in the nose sooner or later sets up a chronic rhinitis. Once in a great while eye symptoms develop, affections of the tear ducts, a recurring iritis, or a chorioretinitis.

In regard to diagnosis, pus under the middle turbinate may come from the frontal or anterior ethmoid cells as well as from the antrum. As the antral orifice is near the roof, the head held horizontally and to the opposite side will increase the flow of pus, if it is not too viscid. A small silver canula can sometimes be passed through the antral orifice and the cavity either inflated with compressed air or irrigated, which will bring out whatever it contains and give valuable aid in arriving at a diagnosis. It is justifiable to remove part of the middle turbinate to gain an entrance to the antral orifice. If you still fail, an exploratory puncture through the wall of the middle or inferior meatus or through the canine fossa may be made. This is done with a trocar and canula or an especially devised steel exploratory needle. In using the middle meatus route care should be taken not to enter the orbit by mistake.

I prefer the canine fossa or inferior meatus routes, for then one can inflate with compressed air and drive the contents of the antrum out through the normal opening. Aspirating is not very reliable, as the membrane is liable to be quite thick and the needle may not pass through it; and again, the pus may be so viscid that it will not pass through the needle; but by inflating or douching through the needle or canula you will break through whatever membrane may cover it and drive the thick secretion out through the normal orifice, taking for granted that it is open because of the pus in the middle meatus.

Transillumination is of some help, especially where the affected side is quite dark, but is not at all reliable. It may be a rudimentary antrum that causes the darkness, for example.

If there is an opening through a tooth socket from which pus is flowing, then there is not much doubt about the diagnosis.

The hardest part of all is to determine whether the antrum is truly the site of the inflammation or only a reservoir for pus coming down from the frontal or ethmoid cells. This is at times a difficult point to decide, which may require repeated examinations and sometimes treatment of the frontal or ethmoid cells.

In treating the antrum, most of the cases of nasal origin get well spontaneously or with nasal douching. Those of dental origin,

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as a rule, do not, but treatment of the roots of the affected tooth and the necrotic bone about them, with irrigations through a tooth socket (Cowper's operation) or through the canine fossa, will cure a large per cent. of them. If this method is not successful at the end of three or four months, it never will be. Of the chronic cases, very rarely will a case recover with nasal irrigations alone. A certain number will be cured by irrigations through a tooth socket. Of those of nasal origin, part will get well by making as large an opening as possible into the antrum through the middle or inferior meatus (Mikulicz's operation), with irrigations and the application of antiseptics. But there are a number of cases in which none of these procedures will effect a cure, and a more radical operation must be performed.

Caldwell, Luc, Boenninghaus, and Jansen at about the same time began to adopt more radical measures. The operation I am about to describe follows the method of Jansen nearer than that of the others. Before giving the technic of the operation I will present the histories of two cases, to illustrate some of the points in diagnosis and the result of operation.

Case I.—C. I., male, aged twenty-four years. Consulted me October 22, 1903, because he had lost a rubber drainage-tube into the antrum that he had been wearing in an opening through the tooth socket of his second molar. The antral trouble dates back three years, when he had a decayed tooth removed, part of the root remaining until about one year after the removal of the tooth, when he began to have a purulent discharge from the nose. He had the root extracted, a hole bored into the antrum through the socket, and a rubber drainage-tube inserted, which he wore until it slipped into the antrum six weeks ago. During the time he had the tube in place the discharge greatly diminished, but never entirely ceased. When I first saw him he was thin, anæmic, had gastric disturbances, headaches, pains about the eyes, a bad taste in the mouth, purulent discharge from the nose and alveolar opening, and nasal obstruction. On examining the nose, the membrane over the turbinates was swollen, middle more than the inferior, and pus was emerging from the middle meatus. Operated upon October 23. The antral mucous membrane was found in a state of polypoid degeneration from one-quarter to one-half of an inch in thickness, with the rubber tube in the cavity. No necrotic bone was found. The patient was out of bed the next morning, and the only evidence

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of the operation was some swelling of that side of the face, and he left the hospital the next day. November 13 the discharge had ceased, and he has gained fifteen pounds since the operation.

The preceding case is a clear one of antrum disease of dental origin. The following case shows the difficulty at times of arriving at a diagnosis and source of the trouble.

CASE II.—W. Z. M., male, aged twenty-two years. Consulted me because of an offensive odor and purulent discharge from the nose, with severe headaches and vomiting. Two years previously he had an ulcerated tooth removed. He first noticed purulent discharge from the nose about three months later, but just previous to noticing the discharge he had his nasal septum operated upon and wore a nasal splint afterwards. Under these circumstances it is hard to say which was the cause of the infection, except that if it was caused by the nasal operation it probably would have subsided spontaneously. The patient himself thinks that the tooth caused the trouble. On examination, I find the affected side of the nose very narrow from the septum deviating to that side; the upper part of the nose filled with creamy pus, with an offensive odor of dead bone. The nose was so narrow and the mucous membrane so swollen that it was hard to make out the landmarks. There was a swelling of the mucous membrane in the region of the ethmoidal bulla and middle turbinate, with a perforation near the centre of this swelling leading into the antrum, and, on probing, dead bone was felt, but the pus coming from so high up in the nose led me to believe the trouble might be in the frontal sinus, but as that was the only symptom of frontal disease present I continued my investigation of the antrum, by puncturing the canine fossa and inflating the antrum, which caused the nose to fill with very offensive pus. Transillumination gave no aid, there not being much difference between the two sides. As I was sure of the antrum trouble, I operated upon that first. As a preliminary step to give me room in the nose, I straightened the septum. On entering the antrum I found the lining membrane from one-quarter to three-eighths of an inch in thickness, and necrosis of the upper portion of the nasal wall and of the ethmoid cells. The packing was removed on the fourth day and the nose douched thereafter.

The operation is performed under ether anæsthesia with the jaws held apart by a mouth-gag placed on the opposite side to the trouble, the choana on the side of the lesion tamponed, and a gauze

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packing placed between the cheek and the jaws well back to prevent blood from running into the pharynx. The cheek is retracted upward and outward with a blunt retractor placed in the angle of the mouth.

This gives a very good view of the field of operation. The incision is made from the last molar to the canine tooth, about one-quarter of an inch below the gingivo-labial fold, down to the bone. Then the periosteum is elevated over the entire anterior wall of the antrum, and as far on the lateral wall as necessary. Now, by placing the retractor into this incision and elevating the soft parts a good view is obtained of the canine fossa. With a chisel an opening is made at the most depressed portion of the fossa, large enough to admit a rongeur, with which the entire anterior and part of the lateral wall of the antrum are removed, care being exercised not to wound the membranous lining of the antrum, thereby avoiding troublesome hemorrhage. Now that the bony walls are removed, incise the lining mucous membrane and examine the interior of the antrum for granulations, character of membrane, foreign bodies, etc.

Remove the entire membranous lining of the antrum, giving especial care to the superior internal and external angles. The bone may now be examined for necrotic spots, which are more frequently found about the roots of the teeth, or on the upper nasal wall. Necrosis is frequent in the cases operated upon. It is almost needless to say that all necrotic bone must be completely removed, down to healthy tissue, and any partitions or ridges in the antrum should be broken down and made smooth with the walls. The next step is to remove the bony nasal wall completely, from the floor to the roof, from the anterior margin to the posterior. This is accomplished by placing the little finger into the nose, to act as a guide, and chipping the bone away with a curette or forceps. After a little practice this can be done quickly without injuring the mucous membrane. The inferior turbinate bone should also be shelled out in the same manner. The next step is to examine the ethmoid cells, and, if affected, they should be removed with a curette or forceps, and if the sphenoid sinus is involved, the anterior wall and lining membrane should be removed. Now, with the mucous membrane remaining on the nasal wall, flaps are made to help line the antrum. If you have all the membrane from the middle meatus to the floor, including that of

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the inferior turbinate, two large flaps can be made, one to partly cover the roof and external wall, and one for the floor. I divide the membrane from its anterior attachment and then make a horizontal incision just above the membrane of the inferior turbinate back to the attachment to the bone. The upper flap I place partly on the roof and partly on the external wall and suture the end to the periosteum at the external angle of the incision. The lower flap is laid on the floor of the antrum and sutured in a like manner to the periosteum, as far externally as it will reach.

I now pack the cavity firmly with iodoform gauze in such a way that it can be removed through the anterior naris, and then I close the buccal wound with silk sutures. On the fourth or fifth day the packing is removed and not replaced, also the sutures, the cavity simply being douched thereafter several times daily with a normal salt solution.

There is considerable swelling of the upper lip and cheek from the stretching received during the operation. Some cases need an opiate to relieve the pain after operation, as the infraorbital nerve is injured during the operation. There is no sensation in the soft parts for a number of weeks. The cases can generally leave the hospital the day after the packing is removed.

Indications for the Radical Operation.—If a diseased antrum has been treated for several months by one of the more conservative methods without result, the radical procedure becomes necessary to effect a cure. In certain cases, that have received no previous treatment, it seems useless to try the conservative operations,—namely, where there is considerable necrosis, which can generally be diagnosed by the odor and probe; or where the ethmoids and sphenoid sinus are extensively involved.

Advantages of the Operation.—You have a full view of the interior of the antrum, and in removing the nasal bony wall and using the nasal mucous membrane to partially line the antral cavity, the antrum, as such, is eradicated and made part of the nasal cavity proper, making a recurrence of the disease impossible, as there is no antrum, only a recess in the nose which is accessible through the anterior naris. The mucous membrane of the inferior turbinate continues to functionate, as is shown in an attack of acute coryza, when it swells, as does the turbinate of the other side. The opponents of this method contend that there are two disadvantages, —one, that it will cause a dry pharyngitis, from increasing the

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caliber of the nasal chamber; in fact, it is not increased as much as they think, as the posterior third of the inferior turbinate remains, and part or all of the middle turbinate, unless the ethmoids have been involved. The other disadvantage, they contend, is that it does not always cure. I have yet to see a case it has not cured where the disease has been fearlessly and thoroughly removed.

DISCUSSION.

Dr. T. Passmore Berens.—Dr. Hurd's paper has been such that it leaves but little to be added. However, the subject is one of considerable interest and of such importance that perhaps you will pardon my emphasizing one or two points in the doctor's remarks.

In discussing the subject before us,—chronic empyema of the maxillary antrum,—it is necessary to understand what is meant by chronic suppuration of this cavity. Chronic empyema may be defined as a suppuration that has persisted more than six months, although, as the writer has stated, it may apparently begin as a chronic disease.

The etiology of these cases frequently is remote, but in the majority of instances the infection may be traced to various intranasal infections,—*e.g.*, grippe, scarlet fever, etc.,—or to a direct infection by diseased teeth.

The first class of infections of the antrum, those of nasal origin, usually are associated with a more or less extensive infection of all or part of the pneumatic cellular structure of the rest of the accessory sinuses,—viz., the ethmoid cells and the sphenoid sinus; and in many of these cases the maxillary antrum acts only in a passive way as a reservoir for the pus formed in the superimposed ethmoid cells. This pus, in turn, sets up various pathological changes in the lining of the antrum, and usually results in granulations and myxomatous tissues. These changes in the antrum may, and most frequently do, cause various symptoms in the teeth, the most frequent of these being dentalgia. In many of my cases this dentalgia was the most prominent symptom present, and the particular symptom from which the patients sought relief, a relief often too readily but vainly promised by extraction.

A diseased tooth may be, and not infrequently is, the cause of antrum disease, usually of an acute type; and, unless prevented by the proper treatment, this type may rapidly change into a chronic

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one. Given a tooth with an ulcerated root protruding into the antrum, and allowed to remain until granulations and necrosis have formed about it before its extraction, obviously the extraction of the tooth *per se* may not remove the necrosis and granulations. The necrosis may be extensive and the granulations form a large mass in the cavity of the antrum, and while the extraction permits of drainage through the tooth socket, this drainage frequently is insufficient to control the spread of the necrosis or the growth of the granulations, and we thus have the beginning of a stubborn antrum disease; again, the incomplete extraction of diseased roots will result in the same condition.

I have seen several instances of each of these conditions. In cases of this character there may readily be an extension of the disease into the other accessory sinuses. A point I wish to emphasize is that a tooth that has been troublesome for a long time,—several months,—if it has caused antrum disease at all, may have caused empyema long before the empyema is suspected, and thus the condition may really be a chronic empyema from a tooth when first it is diagnosed; and, therefore, that a discharge that does not yield readily to treatment after tooth extraction and proper treatment through a drainage opening should be suspected to belong to this class of chronic cases and treated accordingly. Another point I wish to make is that cases of dentalgia accompanied or not by other neuralgias, or by nasal pus, should be suspected as of antral origin, even when in the presence of decayed teeth; that is, that antrum disease and not the decayed teeth may be causing the dentalgia.

To be clearly understood, briefly stated, I believe that antrum disease is caused many times by diseased teeth; but, on the other hand, that many a sound tooth has been sacrificed when proper treatment of the antrum would have saved it. I believe also that extensive disease in the antrum may under certain circumstances cause ulceration and death of a tooth.

During the last two years I have operated on eighteen cases of chronic empyema of the maxillary antrum. Fifteen of these cases were successfully operated upon by the Jansen operation, similar to the operation described by the author. Three cases were operated upon by milder measures. Of all of these cases, twelve had a history of some sort of trouble with the teeth; in four, diseased roots were found on operation lying buried in granulation tissue,

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and necrosis in the floor of the antrum. In three other cases all of the teeth of the upper jaws had been wrongly extracted years before for cure of the dentalgia; and in one case the teeth were saved from extraction and the dentalgia cured by operative measures.

As to the operation of preference in these cases, there is no rule that can be laid down for our guidance; we must be guided by our general experience, together with a careful study of each case. In advanced cases, and especially when multiple sinusitis is present, as it practically always is, the operation of Jansen, as described so accurately by the reader of the paper, is beyond question, in my hands, the most satisfactory. In less advanced cases the Moure or Caldwell-Luc is sufficient.

In any operation for chronic suppuration, however, it is a *sine qua non* of success that a large free permanent opening be made at the floor of the antrum and between it and the nose. If this opening is sufficiently large and far forward, with proper appliances a good view of the antrum may be had and the result of its treatment noted.

Dr. Dawbarn wished to congratulate Dr. Hurd upon his excellent operative results in a class of troubles where good results and not persistence of lingering annoyance from discharges, etc., means that thorough work has been done. Dr. Dawbarn proceeded to discuss several points of the paper. Alluding to the fact that frontal sinus suppuration is sometimes a cause of antrum infection, and not always suspected where the infundibulum is large and so pus drains freely and without its retention causing frontal pain, he mentioned that the opening of the frontal sinus and that of the antrum lie side by side, the former anterior, in the middle meatus of the nose; so that in dorsal recumbency the frontal pus necessarily drains directly across the antrum opening, or, more properly, openings; for though there is but one in the skeleton head, there generally are two, quite small and close together, in the mucous membrane here.

Dr. Hurd had taken the position, in his address, of believing that disease of the roots of teeth in the antral floor is a very common cause of disease of this cavity. In this he is widely at variance with numerous careful observers, though admittedly he can find others agreeing with him. But in a paper on this disease,[1] Dr.

[1] "Disease of the Antrum," read before the Central Dental Association of Northern New Jersey, April 16, 1900, published in Items of Interest.

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Dawbarn quoted Dr. Stout, of Philadelphia: "Dmochowski, after making one hundred and fifty autopsies (for this purpose), holds that but few cases have a dental origin." Again: "Fletcher, in five hundred skulls, in two hundred and fifty-two of which there were abscesses of the upper molars, found only twelve molars perforating the floor of the antrum." Also: "Carious teeth would appear to be an effect rather than a cause of antritis (Fränkl)." Stout himself states that he has never seen a case caused by carious teeth. However, Mears, of Philadelphia, agrees with Dr. Hurd in thinking the teeth the chief cause.

Dr. Dawbarn called attention to the very severe operations necessary in the cases shown to-night, and said that doubtless Dr. Hurd had not intended to indicate, by not mentioning the mild plans of treatment used in mild cases of antrum disease, that he treated all cases in this manner. On the contrary, a free opening in the anterior wall just above the gum, permitting admission of the little finger, and thus enabling a careful study of the cavity, so differing in different people, and in simple cases draining this and gently packing with mild, soothing antiseptic gauze—this plan suffices for many cases, gradually to effect a cure. But in the really severe cases, and also those which had become chronic through years of neglect, we are face to face with a problem practically identical in principle with that met by the surgeon in empyema of the pleural cavity,—namely, a rigid walled cavity lined with a membrane discharging pus into that cavity. And where the lung is bound down by inflammatory exudate, mere drainage of that pleural space by excising an inch or two of a rib, low down, to permit of good drainage through tubes would almost never suffice. Either the outer wall must be made to collapse against the inner by dividing a series of ribs, or (as recently is being done) at the same operation dividing, and even stripping off sometimes, the thick, unyielding membrane tightly holding the collapsed lung, this organ quickly expands to meet the ribs; and then a cure follows by "secondary adhesion," the growing together of the two surfaces which so long have formed pus. Now, in the antrum, similarly, given the worst inflammatory diseases of it, we must, as Dr. Hurd's cases show, carry out the same idea, or else expect a permanent continuance of the trouble. As it is not feasible here to remove the rear wall nor the upper, and not, as a rule, the inner (unless these are themselves diseased), there remains the front

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bony wall; and this is most freely sacrificed, together with the suppurating lining membrane. Healthy flesh fills in the space thus left, and with much less evidence of the operation left than would be supposed. All cutting through the skin can generally be avoided, in such operations, by those experienced in such work; thereby much adding to the patient's gratitude.

Dr. Fossume.—Dr. Hurd's paper is most instructive, and I would like to relate the circumstances of a case that I had under treatment last spring, as we stomatologists are most interested naturally in cases which are in line with our actual professional work. The patient had been suffering a good many years with a continuous pain in the upper right side in the vicinity of the molars. There was distinct heaviness, together with some orbital and frontal pain. The two molars and the first bicuspid were loose, and directly above and between the buccal roots of the first and second molars there was a discharging fistula. She objected very much to losing the teeth. I opened the three teeth and found the pulp of the second bicuspid congested and semivital, and this I extirpated by pressure anæsthesia, and sterilized the canal and filled it. The roots of the molars were partly filled but badly infected, and there was a very distinct putrescent odor. The canals in all six roots were very small, and it was with great difficulty that I cleansed and filled them. As the patient had not the slightest relief after the canals were filled, and the discharge had not abated in the least, I injected beta-eucaine hypodermically around the buccal roots of the molars, and with a long shank bur bored away the alveolus and amputated the ends of the posterior buccal root of the sixth-year molar and the anterior buccal root of the twelfth-year molar. I found these roots penetrating the antrum, and although I do not really believe the case was one of true abscess of the antrum, I feel positive that the lining membrane was affected.

When I syringed the wound, the solution would pass through the nose. In the dressing and the after-treatment of such a case I have found the greatest help and most satisfactory results from using carbolized oil (a solution of 1 in 40), and a little hydronaphthol. I have substituted at times boiled glycerin and aristol, but have always had to go back to the carbolized oil on account of its soothing influence on the tissues, stopping pain at once. Furthermore the dressing will never adhere to the wound, but comes away readily.

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This case was discharged as cured in three weeks, the teeth became perfectly firm, and the abscess disappeared. I have had occasion to see the case this winter, and the teeth are in perfect condition.

Dr. Leo Green.—I am at a loss to understand why the old operation has been so universally condemned to-night as being useless. It has been my fortune to come in contact with several nose and throat men, and I have seen them perform operations in this manner with success. There need be no danger of food getting into the opening during mastication. To prevent this I take an impression of the opening immediately after the operation, with a piece of orange-wood stick, and from this impression make a hard rubber plug to fit the opening, having a shoulder below. This can be removed whenever necessary, to syringe the antrum. I have followed up a number of these cases, other than those upon which I operated, with uniformly good results. I have in mind one case which seemed to call for a radical operation, but to which I was opposed. It was my opinion that the trouble in this case was due to an injury to the nerve in the anterior buccal root of the molar, caused by the bur in drilling into the antrum. The tooth was finally extracted, and this condition was found to obtain. The indications for a radical operation disappeared after the extraction.

Dr. F. Milton Smith.—I do not understand that Dr. Hurd advises these operations unless in extreme cases of antrum trouble where all other measures of a milder sort have failed. My own experience in this line of work has been very limited. I have seen, in my practice of thirty years, four or five cases which in one way or another involved the antrum. I have read some on the subject, talked with those who know of the matter, and have the impression that in years gone by some of our leading men along these lines have taught us that about the best we could do with these old chronic cases was to keep them in as cleanly a state as possible. Of course, the operation Dr. Hurd has described to us to-night is radical, and ought not to be done unless it is needed, but it has seemed to me that as between wearing one of these drainage-tubes all my life and submitting to such an operation, I should prefer the latter.

Just a word regarding some of these simple cases that do not come within the range of Dr. Hurd's operation, where there is possibly simply a puncture into the antrum from an abscessed root

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or some other cause. I had under my observation some ten years ago a patient in one of whose upper molar teeth the pulp in one of the canals had become devitalized. It had gone on to suppuration, causing a discharge of pus into the antrum. He had called upon a dentist, who had opened the tooth and then sealed it up again and gone away from town. During the week of his dentist's absence he came into my office suffering terrific pain. I could not account for the acute pain until the tooth was opened, when I found live pulp-tissue in the remaining two roots, the extreme pain coming from the pressure of the pus upon this sensitive tissue. After evacuating the pus I treated the canals once or twice and then filled the roots as I would fill an ordinary root. Then through an external opening I treated the antrum a number of times, until one day he appeared for treatment and I was unable to find any opening. It had healed. I have no doubt that if I had not treated as long as I did it would have healed more quickly. This seemed to be illustrated by another case that I had where there was a discharge into the antrum from a suppurating condition of the roots of a tooth. As it was a tooth that had given considerable trouble, I decided to have it out, and after the extraction thought I would see what would happen without any treatment of the antrum at all. The case got entirely well of its own accord.

Two or three years ago a patient had trouble with his antrum. His dentist told him the trouble was caused by the root of a tooth left in after an extraction. He had advised that the antrum be opened and thoroughly treated. He was not willing to have this done, and eventually fell into my hands. I told him that perhaps a mild antiseptic used with the nasal douche might be all that was necessary. He used this for about a week and came back vastly improved. In three weeks' time there was no further disturbance. I mention these cases merely to show that there are cases that do not need operative treatment, and for such cases I am confident Dr. Hurd does not advise the radical operation.

Dr. Hurd.—I believe I stated in my paper that it did not have reference to simple cases. Nearly all of the acute cases will get well without an operation. Of the chronic cases, some will get well and some will not, and it is in these latter cases that we perform the radical operations.

With regard to the walls of the antrum collapsing, I do not see how the anterior wall of the antrum can collapse much.

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In regard to transillumination as a test for disease of the antrum, sometimes it fails entirely. In the same mouth I have seen the normal side appear denser than the affected side.

Dr. J. W. Canaday, of Albany, read a paper entitled "A Study of the Dental Club in its Relation to the Dental Society."

The President.—I feel that the great value in the paper will be found, not so much in relation to us here to-night as among the men to whom our voice goes through the country, encouraging them to form dental clubs in the small cities. It is in this manner that the greater value of the paper will be found.

Dr. F. Milton Smith.—The thought to which our chairman has just given expression has been uppermost in my mind during the reading of the paper. We are fortunate in that the proceedings of our meetings go round the world. Papers of this character, if carefully and thoughtfully read, will greatly help the dental profession. It is meeting in this informal way that is going to make better men and better practitioners. I think I feel strongly upon this point because of the great help I have had from the little gatherings I have been permitted to enjoy in this town, perhaps at somebody's dinner-table or out for a walk with some friend.

The President.—Before we adjourn, I wish, in the name of the society, to tender, especially to our two medical friends and to Dr. Canaday, who has come to us from Albany, the most sincere thanks of the Institute for their kindness in addressing us to-night.

Adjourned.

OFFICERS ELECTED.

THE annual meeting of the Institute was held on Tuesday afternoon, December 6, 1904, at the "Chelsea," No. 222 West Twenty-third Street, New York, the President, Dr. A. H. Brockway, in the chair.

The following officers were elected for 1905:

President, C. O. Kimball; Vice-President, S. E. Davenport; Recording Secretary, H. L. Wheeler; Corresponding Secretary, J. Buckley Locherty; Treasurer, J. Morgan Howe; Curator, S. H. McNaughton; Editor, F. L. Bogue.

Executive Committee.—F. Milton Smith, Chairman; C. F. Allan, E. A. Bogue.

FRED. L. BOGUE, M.D., D.D.S.,
Editor The New York Institute of Stomatology.

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